

AVIATION WEEK

JULY 4, 1949

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brings him in safely (or doesn't)*

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● L-M High Intensity Runway Light, at left, provides up to 180,000 beam candlepower, without glare, possible only because of the controllable beam feature. At the right is the L-M medium intensity unit, for smaller airports and secondary runways and taxiways at major ports.



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Then... we turn on a blast of CO₂, N₂, CB, DL—or one of the many Trecons. Every one of these chemicals has its turn at the job—and we check the fire-killing speed of all of them with split-second precision.

We've found out a lot about fire-fighting, naturally, in this busy laboratory of ours—and we're ready to pass on what we've learned to government agencies, plane manufacturers and airline operators. If you have a specific problem, we'll be glad to discuss it with you.



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New England, to New York and Midwest. The airline's fleet of 10 Boeing 747-200 aircraft operates throughout the Northeast and Midwest.



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TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

Probe Problem

One of the big battles in the current presidential investigation of the B-52 is finding a lawyer to handle the show for Rep. Carl Albert's Armed Services Committee. Job has been offered to a number of well-known Washington lawyers but no takers have been found. Another hitch is in getting adequate technical aid to start the investigation through the maze of secrecy and military performance arguments that are sure to pop up. Most of the best technical aid and law firms already tied with other aircraft industry or military services to qualify as "impartial experts" sought for the probe.

Groy's Policy

Military procurement officials in the Air Force and Navy are taking some tips from Army Secretary Gordon Claiborne to handle their procurement policy. When Groy was assistant secretary of the Army responsible for procurement, he established a process where information center attached to his office where all of the latest information on Army bids, contract awards, and procurement policy was available for business men interested in Army business. Claiborne also took the lead in making public all Army contract awards over \$100,000, a policy which USAF and Navy procurement heads are still backing.

Loan Pressure

Congressional pressure may cause the Reconstruction Finance Corp. to bail out of a \$17 million loan to Northwest Airlines for Stratospheric purchases.

CAB recently approved the loan, but it has not yet been concluded by RFC. Key members are concerned that the loan means that CAB will be obliged to grant sufficient aid and pay to North to get the loan to protect the government's investment.

Sen. Edwin Johnson (D., Colo.), chairman of the Senate Interstate and Foreign Commerce Committee, wrote a letter over two months ago to CAB opposing that it clearly favors it and weigh in approving RFC loan to airlines and that the government and implications of its approval would be.

The letter has not been answered. But a Senate banking and currency subcommittee headed by Sen. William Fulbright (D., Ark.), has announced CAB intention to study on the matter.

NEWS SIGHTS

Last Airmail Pickup

A merger chapter in aviation history is closed with the termination scheduled June 30 of All American Airways' airmail pickup service. Most of the same components, if they have wings, will continue to be served by All American as it now, at least until 67. But new it's an orthodox airline passenger mail and express service with no airmail. DC-1 24-passenger transports.

The pickup service used mail planes, and it took some precise low-altitude flying for the AAA pilots to hook a 10 ft boom extended from the bottom of the plane into a nylon rope stretched between two poles on the ground to grab a mail sack from the ground.

It brought airmail service far more than a decade to more little towns in the western states which had no airports. And as he projects the scheduled history of the pickup system were changed far and away from glider pickups, reportedly used in World War II and the revolutionary business pickup also developed for military use.

Richard Helms, Federal Power Commission official who made an airline study for RFC last year, has opposed the National Aeronautics and Space Administration and the Banking and Currency Committees.

Laying out the details of the Northwest Airlines, Helms argued that it would be better to let the airline to replace its DC-1s with Stratospherics on its own route where flight savings only 12 passengers. Helms also suggested that a Stratospheric fleet might require "Navy" to obtain an additional 511 engine loan for a Stratospheric RFC loan requests by airlines now total approximately 516 million.

Merger Rumors

TWA President Ralph Duncanson squashed rumors of a TWA-Northwest Airlines merger during his appearance before the Senate Interstate and Foreign Commerce Committee. Quoted on the point by the committee's chairman, Sen. Edwin Johnson (D., Colo.),

Duncanson closed that any discussion had taken place between the two carriers.

Johnson credits that no merger can be worked out under present CAB policy. By the time the Board has processed a merger case, he estimated, the parties which proposed the case will have changed. "It seems that the CAB might very well outline mergers which it would approve, and then if the interested companies could work their problem out, they would have an advance that they were going to have CAB approval, the merger can proceed."

Airlift by Airship?

Goodyear Aircraft Corp. which can be depended upon to make the most of each opportunity to sound the U.S. government and public about big savings has done it again—this time with an engineering conclusion of how 18 hyperbaric modern dirigibles could handle the heavy lift as the rate of 4500 tons a day divided up into loads of 125 tons per flight as compared to a 25 ton load of the C-141, large heavier than air transport used.

The Goodyear analysis prepared by T. A. Kowalski, vice president and general manager, points out that the short range of the airship is not the type of operation in which the airship can do its most efficient work. In the case of the lightest airship, Kowalski estimates that the 18 dirigibles could fly sequential flights, at 1000 tons a month, using 600 crewmen, with 10,000 flights and 2,470,000 gal. gasoline. This compares with 60 C-141s which would use 2,400 tons a month to carry the same tonnage in 14,700 flights at 167,000 gal. gasoline.

Other cargo carrying advantages at the big airship for the airship itself. It is in the air for a longer time in a relatively unengaged state ability to deliver cargo without landing at all, ability to operate without wing walk is also a significant consideration. Ability to carry large individual items, weighing 15 to 20 tons each, adequate fuel storage, and ability to lower its emergency, low fuel consumption per pound of payload.

Kowalski says that after the transportation pipeline has been filled and used, operations are considered, the problem of a steady flow of a certain number of tons per week or month is not of regularity rather than the speed of single flights. The airship would of course have an advantage of probably 1 to 1 over dirigibles in response.



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AVIATION CALENDAR

- July 8-Second joint meeting, Institute of the Aeronautical Sciences and the Soaring Society of America, El Paso, N. Y.
- July 29-31—Annual meeting, Nat'l Assn of University Administrators of Aviation Education, Kent State University, Kent, Ohio
- July 19-20—National Assn of State Aviation Officials board of directors meeting, Grand Hotel Mackinac Island, Mich.
- July 21-22—US annual summer meeting, IAS Building, Los Angeles
- Aug. 6-14-1950 West Coast meeting, Thompson, Palmdale Airport, Calif.
- Aug. 7-9—Second annual southeastern wing contest, NTAC airport, Cross Plains, Tex.
- Aug. 25-26—Flying Circus national convention, Fort Collins, Colo.
- Aug. 29-Sept 1—Aeronautical Assn air mail meeting, Statler Hotel, N. Y.
- Sept. 8-7-International conference of Education - Aeronautics - Instruments, Wade Park Hotel, Cleveland, Ohio
- Sept. 16-1949 National Air Races, Cleveland, Ohio
- Sept. 16-18—Annual spark plug and gas test conference, sponsored by Glavin Spark Plug Co., Hotel Sheraton, Toledo, Ohio
- Sept. 7-11-10th Society of British Aircraft Constructors flying display and exhibition, Farnborough, Airfield, Hampshire, England
- Sept. 9-12—Chicago air maintenance of industrial equipment, Industrial Society of America, Statler Hotel, St. Louis
- Sept. 12-13-ATA 5th annual general meeting, The Regent
- Sept. 26-30—International Northwest Aviation Council convention, Spokane, Wash.
- Oct. 5-6-SAF national aeronautical meeting and aircraft engineering display, Biltmore Hotel, Los Angeles
- Sept. 12-13-ATA 5th annual general convention, Long Beach, Calif.
- Oct. 16-Nov. 2—Annual convention National Assn of State Aviation Officials, New Orleans
- Nov. 9-11—Seventh annual meeting, Avionics Distributors and Manufacturer Assn, Francis Lark Springs Hotel, Peach Lake, Ind.
- Jan. 19-19, 1951—All-American Air Maintenance Meet

PICTURE CREDITS

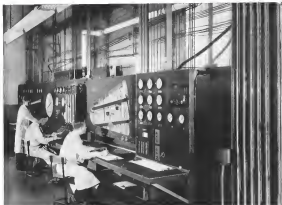
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WRITE FOR LATEST LITERATURE



24 readings can be taken on the line of several small pumps in Wright turbine development laboratory

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- Accuracy analysis of an aircraft turbine engine—measuring its pressures and temperatures power—requires intricate components for component testing. That's because the turbine engine is a turbo-prop or turbo-jet develops two or three times the net output of the complete power plant. The difference is required for driving the compressor.
- In Wright Aircraft's integrated turbine development laboratory—with its 250 miles of wiring and gauges requiring 600 pounds of inventory and some miles of copper tubing—up to 252 separate, simultaneous measurements can be taken on a single engine.
- More 15-foot-high manometers—pressure-vacuum gauges—slide up and down on tracks to facilitate the accurate reading of pressures developed during test runs.
- More dynamometers of 25,000 horsepower capacity absorb and measure power developed by a turbine wheel—powered electric motors drive the test components—large oilseals seal the tests.
- Here is every facility for performance research on turbine engine components to enable Wright engineers to develop more powerful, more efficient power plants for the aviation industry.



POWER FOR AIR PROGRESS

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Air Force Faces \$800 Million Budget Cut

Rather than raise taxes or run up deficit, Congress seeks economy—and eyes AF.

The economy drive, now in full swing in Washington, threatens to slash \$800 million out of the Air Force's budget for the coming year.

Faced with a multi-billion dollar federal deficit for the current year, the Truman Administration and the Congress have three alternatives:

- **Leaping into deficit financing.**
- **Increasing taxes.**
- **Reducing expenditures.**

The last is the least detested to both.

Developments last week indicated that USAF would be a principal victim of the economy drive war.

- **Secretary of Defense Louis Johnson**, in a closed session of the Senate Appropriations Subcommittee on the armed services, placed himself squarely behind the \$4.4 billion USAF budget recommended by the Administration, and withheld his support from the \$5.2 billion budget voted by the House. The Administration proposes, including \$1.8 billion for procurement of 156F fighters, accelerating a 40-group program. The Congress with the \$1.1 billion allowed for procurement of 265F USAF planes for the current year.

The \$4.4 billion asked by the House for USAF would implement a 57-group program, and provide for a total \$1.6 billion program for procurement of 253H planes.

The proposal cut in USAF budget would mean that the aircraft industry could look forward to military business out of fiscal 1970 funds slightly lower than the record procurement appropriation of last year. The wartime budget passed by the House would have boosted military aircraft procurement (USAF and Navy) for fiscal 1970 to \$2.9 billion (for 1961 plans).

The original Truman budget for fiscal 1970 called for \$2.1 billion in procurement funds, for 252 planes. Last year's appropriation amounted \$2.7 billion (for fiscal 1969).

- **Senate Appropriations Committee** appeared set to eliminate the \$800 million added to the USAF budget by the House. After reaching hearings,

held on closed sessions, on the 1970 fiscal year National Military Establishment budget, Sen. Elmer Frost (D., Okla.), chairman of the appropriations subcommittee on armed services, told Aviation Week that he "definitely" favored striking out the funds. Sen. Clair Gordon (R., S. Dak.), a subcommittee member and former chairman of the Armed Services Committee, also early supported the cut.

- **Chairman** for a successful fight to save the \$850 million spent on. Unlike last year, when he was openly fought for a 70-group USAF, Secretary of Air Staff Symington is reported to be trying to bring down from ignoring USAF proposals in Congress is to justify for the 57-group program. Sen. Lister Hill (D., Ala.), a member of the appropriations subcommittee on armed services and one of the most vocal USAF advocates in Congress, told Aviation Week: "My disposition is against cutting back in a 45-group program. But it might go down."

- **House Fight**—Should the Senate approve the cut in USAF funds the House is not expected, however, to expedite without a fight. Rep. Clarence Brown (D., Ohio), chairman of the appropriations subcommittee, and Rep. George Mahon (D., Tex.), chairman of the appropriations subcommittee on the armed services, are the strongest proponents of a big savings program.

Thomas told his appropriations subcommittee to reduce the Administration's \$15 billion national defense budget to \$1.1 billion, but that a \$1 billion reduction would be "the maximum." In addition to the USAF budget, Thomas suggested that the goal could be accomplished by streamlining from \$180 million to \$150 million in stockpiling funds and "making some cuts in other areas."

- **Air Staff Studies**—Two studies now underway will have an important effect on the subcommittee's final action. They are:

the subcommittee's detailed survey that can be made in the 1970 fiscal year military budget through consolidation and reorganization of activities. Legislation giving the Secretary of Defense additional authority to eliminate waste in the department, recommended by the House Committee, is now pending before the House Armed Services Committee. It has already been passed in the Senate.

Emphasizing on the income last week, Secretary Johnson said that it would enable him to have in effect at the end of the year economy "at a rate of \$1 billion a year." Later, Johnson declined to estimate for Aviation Week what the savings would total for the 1970 fiscal year. Should the study of the House or Congress representative democratic, specifically that several hundred million dollars can be saved through efficiency, it will somewhat cut the pressure for the USAF and for making large cuts in the military program.

I want definite cuts to accomplish a \$1 billion reduction in the military budget," Thomas observed. "I do not want to appropriate the money with the same provision that the House will be able to save out some with its additional in theory."

2. USAF is now making a detailed audit of the comparative strength of the military and the 57 group program for the subcommittee. This will weigh heavily with USAF congressional supporters in deciding whether to put up a fight in the Senate for the larger program proposed by the House. If it is rejected in some quarters, Secretary Symington announced the necessity for a 57-group program in the report it could pull the rug from under services now seeking to support it.

Navigator Training

The Air Force will begin to train student pilots in navigation for the first time when the war. First class is scheduled to begin Nov. 1 at Edgewood AFB, Mo. The first class will consist of 100 students. Douglas C-47 and C-47B aircraft will be used. The first class will consist of 100 students. Douglas C-47 and C-47B aircraft will be used. The first class will consist of 100 students. Douglas C-47 and C-47B aircraft will be used.



WARD—Widener retirement benefits



FAIRCHILD—Would withdraw Ward

Ward-Fairchild Showdown Due

Stockholders vote this week on opposing stances of directors, with management of company the stake.

Stockholders in the Fairchild Engine & Airplane Corp. this week will decide whether they retain Chairman J. Carlton Ward, Jr., and the present company management or accept Sherman Fairchild's proposed board of directors.

The move is seen by both sides as a showdown, specifically that several hundred million dollars can be saved through efficiency, it will somewhat cut the pressure for the USAF and for making large cuts in the military program.

- **Management**, the stockholders want to return to "the Sherman Fairchild era" during which time the company lost money.

- **Fairchild Faction**—Do stockholders want "disorderly, full disclosure, and team management in the place of current direction?"

Chairman of Ward's retirement benefits as his own report, as an issue in dispute. Aviation Week, June 27, was given by the Sherman Fairchild group as "the largest return yet to any stockholders." But Ward, a father to stockholders, gave three reasons why he "should be allowed to look to the original contract, without the current business."

- **A substantial number of stockholders** did not understand or were not in favor of the new management.

- **Contract dispute**—"was observing the real issue" which is "control of the corporation."

- **Fairchild faction's proxy** "wants a full board" for stockholders to express an opinion on Ward's contract without voting for Sherman Fairchild's board of directors.

Meanwhile, stockholders last week were presented with a new crop of proposals.

- **Sherman Fairchild** stated he would

not accept any office in the corporation if his slate of directors is elected. Richard S. Bortelle, former general manager of the aircraft division at Hagerstown, was nominated for president by the Fairchild group. Bortelle is vice president and director of the corporation, was relieved of his duties by management (Aviation Week, June 11).

- **Twenty employees** at the Hagerstown division released a statement stating: "We are proud to be part of this division to Bortelle and Arthur F. Flood, former division controller who was also relieved of duties by management."

Whatever the outcome of the election, Sherman Fairchild already has won his original fight, directed against the retirement provisions of Ward's employment contract.

Fair for Air?

Directors of the Air Transport Association last week, to begin preliminary exploration of the possibility of opening an air line similar to the national transportation now running in Chicago. The reform for forming the historic development of rail transportation and a display of modern railroad equipment has been an outstanding success.

ATA directors also approved a \$268,000 budget for the last half of 1969 as a study in expanded program for the air program and traffic control unit. The new ATCT unit will be headed by Capt. Sen. Sen.

Luscombe Seeks Reorganization

Nutrition petition for reorganization of Luscombe Supply Corp. under section 19 of the Chandler Act was filed last week in Dallas U.S. District Court by L. B. P. Kline, president.

Kline said a shortage of liquid capital and division of creditors had forced the application. He reported assets of approximately \$1.2 million including more than 400 acres of land appraised at over \$500,000 and factory equipment and machinery valued at \$100,000. Total indebtedness is listed at \$100,000. He stated that the company had paid off \$3 million in debts since October 1946.

Clayton Green, Dallas attorney, has been appointed trustee in charge of the reorganization, and present offices in Irving. Kline is continuing under Chapter's direction. A reorganization plan will be drafted and submitted to the court at a later date. Meanwhile, the company expects to continue production of its metal personal plates and work on several military aviation contracts and subcontracts.

Puerto Rico Probe Finds C-46 Overload

New restrictions on overloaded planes flying between Puerto Rico and New York City have followed the Strato-Flight C-46 crash which killed 33 people. And the Civil Aeronautics Board's investigation of the accident is shedding new light on travel agent practices.

The developments:

- **At Puerto Rico's** Vice Grande International Airport, departure point for the San Juan-New York run, pilots were warned not to exceed 10,000 lbs. flights were delayed after Civil Aeronautics Administration imposed a regular new imposing a special type pilot log in C-46s.

- **Puerto Rico** Commission previously ordered airport officials to weigh arriving passengers and baggage to make sure they complied with clearance figures filed by the airlines (Aviation Week, June 23).

- **CAB's investigation** of the crash was held in San Juan. It brought out that the plane was overloaded by 2,075 lb. when it took off on the ill-fated flight, according to CAB investigators who weighed the plane and took over 100 measurements from relation of various pieces. Earlier some passengers had testified they had not been weighed before boarding the plane.
- **Strato-Flight** records indicated the

AF Projects

Armed services public works program improves Air Force facilities.

A \$20,512,980 acquisition of Marine Air Force Base is provided in legislation authorizing a \$284,175,682 annual services public works program. This includes experimental parachute facilities, advanced engineering testing facilities, a radar and electronic test facility, long-range and short-range test facilities.

The program has been authorized by Chairman Milford T. Tucker (D., Md.) of the Senate Armed Services Committee, and Chairman Carl Albertson (D., Cal.) of the House Armed Services Committee.

Other Air Force projects

- **Ames facilities**—For domestic and foreign test and communications facilities, \$18,875,000, for design and replacement of domestic aircraft lighting, \$1 million.

Facilities outside of the continental United States: \$7,985,375 for six major radar stations, \$17,115,181 for three multi-channel single-side band stations, \$1,590,000 for northeast Coast class, \$1,351,061 for point-to-point communications facilities, \$72,994 for ground control approach facilities.

- **Petroleum storage**—\$14 million for strategic fuel petroleum storage facilities, various experimental.

- **Wright Field**—\$1,140,910, including building and shop modernization and addition of a high-pressure electric short range, a vibration test building.

- **Albuquerque, N.M.**—AFB—\$7,678,725, including instrumentation building and control instrumentation aids, auxiliary assembly facilities, photo laboratory, tracking device, instrumentation and radar alarm tests in range area, technical

building, upper atmosphere research system.

- **Biggs AFB, El Paso**—\$4,717,600, in changing station fuel storage facilities and aircraft pavements.
- **Campbell AFB, Templeville, Md.**—\$496,000, including control tower and security fence.

- **Coffey AFB, Miami, Calif.**—\$6,171,000, including aircraft pavements, new water extension, auxiliary fuel storage facilities.

- **Charleston AFB, Savannah**—\$1,175,000, for auxiliary fuel storage facilities, aircraft pavements.

- **Elmendorf AFB, Alaska**—\$37,000 for auxiliary navigation training building.

- **Grant Field, Miami, AFB Base**—\$7,051,000, including auxiliary fuel storage facility, infield pavements.

- **Grafing AFB, Rome, N.Y.**—\$1,214,100, for auxiliary radar grid division, radar instrumentation, building structure development of instrument landing system, navigation system building.

- **Hanford AFB Base, San Rafael, Calif.**—\$2,191,000, including aircraft pavements, auxiliary fuel storage facilities.

- **Hood AFB, Temple, Tex.**—\$2,309,457, including operating building control tower and fuel tank station, night lighting, instrument building, fuel storage, distribution lighting.

- **Langley, Va.**—AFB—\$25,914,200, including fuel storage facilities, fuel and fuel station, bomb loading facilities, case magazines, bombing school, command center and electronic facilities.

- **McGuire AFB, Tampa**—\$4,412,000, including auxiliary fuel storage facilities, aircraft pavements.

- **McGuire AFB, Tennessee**—\$780,000 for auxiliary fuel storage facilities.

- **Montgomery, N.H.**—auxiliary storage—\$261,650 for climate control laboratory.

- **Off AFB, Johnston, Miss.**—\$1,150,

000 for auxiliary fuel storage facilities and hangar.

- **Sebring AFB, Mount Clemens, Mich.**—\$600,000 for fuel storage facilities, aircraft pavements.

- **Spokane AFB**—\$6,645,000, including land expansion, auxiliary pavements, fuel storage facilities.

- **Torrence, Calif.**—\$333,000, for new test facilities, aircraft pavements.

- **Walter AFB, Russell, N.M.**—\$64,672,000, including fuel storage facilities, aircraft pavements.

- **Wright AFB, Dayton, Ohio**—\$7,794,000, at various locations.

Naval aviation operations provided for in the program include:

- **Aviation, Calif.**—Delaware test station, \$10,982,000, including auxiliary water test facilities, auxiliary hangar, fuel and fuel tank, auxiliary ground support and auxiliary instrumentation for guided missile range.

- **Alameda, Calif.**—Air Station—\$990,000, for jet overhaul building.

- **Naval Air Station, Midway, Md.**—\$2,341,000, including main tunnel and completion of three water wing tunnel, fuel storage facility.

- **Chesapeake, Va.**—Aviation test range—\$5,251,400, including guided missile range and associated facilities.

- **Danaherfield, Tex.**—Aviation test station, \$5,251,400, for addition to wind tunnel test facility.

- **Jacksville Air Station**—\$4,570,000, for jet overhaul, training base and approach channel.

- **Jacksonville, Fla.**—jet development station—\$5,251,400, for runway extension for jet operations, acquisition of aviation components, test facilities.

- **Lake Mead, N.J.**—Aviation test station—\$7,500,000, for rocket test and development facilities.

- **Norfolk, Va.**—Air Station—\$445,000 for test cells for turbine engine.

- **Quonset Point, R.I.**—Air Station—\$100,000 for completion of two engine test cells.

- **San Diego Air Station**—\$130,000, for hangover engine test cells.

- **Wallops Island, Wash.**—Air Station—\$15,500, for completion of 314-acre rocket target range.

- **Experimental Range**—\$160,000 (area to be determined) for vertical testing for jet fuel and aircraft damage tests.

- **Fuel Storage Facilities**—To support jet operations, \$5 million at various locations.

- **Rocket Engine**—For jet operations, \$1,320,000 at Alameda, Calif.; Charleston, B.I.; Chazy Point, N.C.; El Toro, Calif.; Norfolk, Va.; Denver, Va., and/or other strategic locations.

- **Aircraft Gas Storage**—Facilities, at various locations, \$5 million.

Air Force Contract Cancellations

Cancellation of \$326,678,000 in aircraft contracts during the past nine months has cut the program approximately \$477,744,000 of the U.S. Air Force expenditures for fiscal 1969.

The \$326,678,000 in right cancelled contracts involved 480 fighters and bombers and 10 transport helicopters. Half of the funds were allocated to purchase of 78 additional C-130 Hercules and modification of the B-36 to add four General Electric J-47 turbojet engines to the Pratt & Whitney Wasp Major engine engines for which the bomber was designed.

Remainder of the funds was allocated to purchase Northrop F-89 jet fighter fighters, Boeing B-47 Strategic (jet bomber), Lockheed F-94 jet fighter fighters, and F-101 jet fighter.

Modification of Boeing B-36s for jet engines was also involved.

The \$42 million loss was estimated by Air Materiel Command on the basis of the cost of material purchased by the contractor and allowances on work completed before cancellations. The AMC estimates at about 15 percent of the total value of the cancelled contracts.

USAF officials said it would be impossible to get an accurate figure on the final loss until all subcontractors claims were received. USAF was unable to tell all material involved in the cancelled contracts.

Contracts cancelled included Convair Wright-58 B-57 night fighter, Boeing B-47C bomber, North American F-101A-100 bomber, F-101A-100 fighter, Northrop F-89B-100 bomber, Northrop F-89C-100 bomber, Northrop F-89D-100 bomber, Northrop F-89E-100 bomber, Northrop F-89F-100 bomber, Northrop F-89G-100 bomber, Northrop F-89H-100 bomber, Northrop F-89I-100 bomber, Northrop F-89J-100 bomber, Northrop F-89K-100 bomber, Northrop F-89L-100 bomber, Northrop F-89M-100 bomber, Northrop F-89N-100 bomber, Northrop F-89O-100 bomber, Northrop F-89P-100 bomber, Northrop F-89Q-100 bomber, Northrop F-89R-100 bomber, Northrop F-89S-100 bomber, Northrop F-89T-100 bomber, Northrop F-89U-100 bomber, Northrop F-89V-100 bomber, Northrop F-89W-100 bomber, Northrop F-89X-100 bomber, Northrop F-89Y-100 bomber, Northrop F-89Z-100 bomber, Northrop F-89AA-100 bomber, Northrop F-89AB-100 bomber, Northrop F-89AC-100 bomber, Northrop F-89AD-100 bomber, Northrop F-89AE-100 bomber, Northrop F-89AF-100 bomber, Northrop F-89AG-100 bomber, Northrop F-89AH-100 bomber, Northrop F-89AI-100 bomber, Northrop F-89AJ-100 bomber, Northrop F-89AK-100 bomber, Northrop F-89AL-100 bomber, Northrop F-89AM-100 bomber, Northrop F-89AN-100 bomber, Northrop F-89AO-100 bomber, Northrop F-89AP-100 bomber, Northrop F-89AQ-100 bomber, Northrop F-89AR-100 bomber, Northrop F-89AS-100 bomber, Northrop F-89AT-100 bomber, Northrop F-89AU-100 bomber, Northrop F-89AV-100 bomber, Northrop F-89AW-100 bomber, Northrop F-89AX-100 bomber, Northrop F-89AY-100 bomber, Northrop F-89AZ-100 bomber, Northrop F-89BA-100 bomber, Northrop F-89BB-100 bomber, Northrop F-89BC-100 bomber, Northrop F-89BD-100 bomber, Northrop F-89BE-100 bomber, Northrop F-89BF-100 bomber, Northrop F-89BG-100 bomber, Northrop F-89BH-100 bomber, Northrop F-89BI-100 bomber, Northrop F-89BJ-100 bomber, Northrop F-89BK-100 bomber, Northrop F-89BL-100 bomber, Northrop F-89BM-100 bomber, Northrop F-89BN-100 bomber, Northrop F-89BO-100 bomber, Northrop F-89BP-100 bomber, Northrop F-89BQ-100 bomber, Northrop F-89BR-100 bomber, Northrop F-89BS-100 bomber, Northrop F-89BT-100 bomber, Northrop F-89BU-100 bomber, Northrop F-89BV-100 bomber, Northrop F-89BW-100 bomber, Northrop F-89BX-100 bomber, Northrop F-89BY-100 bomber, Northrop F-89BZ-100 bomber, Northrop F-89CA-100 bomber, Northrop F-89CB-100 bomber, Northrop F-89CC-100 bomber, Northrop F-89CD-100 bomber, Northrop F-89CE-100 bomber, Northrop F-89CF-100 bomber, Northrop F-89CG-100 bomber, Northrop F-89CH-100 bomber, Northrop F-89CI-100 bomber, Northrop F-89CJ-100 bomber, Northrop F-89CK-100 bomber, Northrop F-89CL-100 bomber, Northrop F-89CM-100 bomber, Northrop F-89CN-100 bomber, Northrop F-89CO-100 bomber, Northrop F-89CP-100 bomber, Northrop F-89CQ-100 bomber, Northrop F-89CR-100 bomber, Northrop F-89CS-100 bomber, Northrop F-89CT-100 bomber, Northrop F-89CU-100 bomber, Northrop F-89CV-100 bomber, Northrop F-89CW-100 bomber, Northrop F-89CX-100 bomber, Northrop F-89CY-100 bomber, Northrop F-89CZ-100 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Military Role

Senate group to study armed forces' surveys on aid of civil aviation.

The National Military Establishment will play a major role in determining the government's future policies toward commercial aviation.

At the request of Undersecretary of Defense Steve Kuhn, three surveys are now separately making comparative studies to determine "the military needs which can be met in whole or in part through the aid of civil aviation, first, in personnel, and second, in materials."

Service findings will be given great weight by members of the Senate Interstate and Foreign Commerce Committee in shaping the future role for the military. The Committee's chairman, Sen. Edwin Johnson (D., Calif.), expects the surveys to be completed by late summer, at which time and place to schedule meetings with armed services representatives.

Defense Justification—"The justification for the federal government spending hundreds of millions of dollars in purchasing and utilizing, in numerous ways, has been that it is a vital aspect of the national defense," Johnson told Aviation Week. "Before we can determine basic policies toward civil aviation development, we must know how far this aid, and in what degree and in which direction the government should continue to promote and sustain for national defense reasons."

Vice of the National Military Establishment are expected to set the Congressional attitude on such basic civil aviation issues as:

- Federal development of the airways, and whether commercial operation should be required to bear costs
- Whether contract and all-volunteer operations should be encouraged
- Whether the government should retain developmental costs on new type transport and cargo aircraft
- Sougenon, Letter-A letter from Secretary for Air Staff Sougenon to Gen. H. H. Nelson, president of Transcon Air Lines, indicates that the armed services may back common development of independent operations. It reads in part: "The Department of the Air Force wishes the necessity of supporting wherever possible, the successful allied contract operations."

After several weeks of hearings on the Senatorial committee, the air transport industry general aviation liaison members of the Senate Interstate and Foreign Commerce Committee and members of the Senate Appropriations Committee who have drafted followed

the proceedings, it is that the present role of government aid for civil aviation is estimated to cost approximately \$100 million annually by the Budget Bureau is not adequately justified by the industry's contribution to either the economy or public interests of the country. The armed services surveys will decide whether the outlay is justified for the national defense and whether federal protection should be stopped.

• Committee Withdrawal—Latest substance before the Senate Interstate and Foreign Commerce Committee.

• Ralph Denson, TWA's president, who had shape blame for the financial instability of airlines on "excessive competition" from unscheduled and freight operators.

He called for Civil Aeronautics Board jurisdiction over contract carriers, a study to determine whether an equitable system of compensation and rates can be established in the domestic field, and if so, expansion of their rates from subsidy payment.

CAI production over passenger and cargo rates of international carriers, and the 15 percent transportation tax, an extension of the Kuhn Technical Committee for Aeronautics' long range plan as a navigation facilities program.

When Denson opposed CAI control over airline financing, Johnson privately pointed to TWA's unbalanced position, on-shipping approximately \$14 million in debt financing and \$10 million in equity financing.

The TWA president quickly endorsed dump coach services for a general move toward coach service, he warned, would change the airlines' rate structure and "compound" their financial problems.

He opposed extreme financing by the Reconstructive Finance Corp. "The

airlines should be sufficiently sound that a normal commercial banking operation should take care of them."

• André de Saint-Philippe, president of California Eastern Airways, maintained that the public interest requires that air transportation be made available to the greatest number at the lowest cost consistent with safety. He served the scheduled airlines system as a subcommittee of the committee, stating that last year the 16 domestic trunk lines averaged 340 million in total, per line, serving only 5 percent of the population.

He had the regular airlines are capable of meeting the needs of mass transportation, since "the type of thinking which produces a Bessie Coleman does in a California can produce a Bessie Coleman in a California."

He highlighted the equipment difference for luxury and coach service, the DC-4 and in luxury service, only 44, but CAI Eastern's DC-4s, leased for coach service, cost \$6.

The CEA president suggested that Boeing Stratocruisers could be adapted for aircraft carrier and carry passengers transcontinentally for \$70 (three seats), compared with the regular line of \$177.55.

• Denis M. Nelson, president of Transcon Air Lines, argued that contract carriers be given first call to fly in groups on the scheduled air transport system.

While maintaining the wage scales of the scheduled airlines, he pointed out, Transcon has shown consistent profits on its operations \$400,000 for the 1947 fiscal year, \$15,000 for 1948, and an estimated \$400,000 for 1949.

Nelson called for restriction of common carrier coach cargo service to Tampa, and the lowering of a ceiling for world-wide air coach service, permitting it to attract and terminate services as dictated by traffic demands.



SPLIT ALIENS ON SCORPION

After several weeks of hearings on the Senatorial committee, the air transport industry general aviation liaison members of the Senate Interstate and Foreign Commerce Committee and members of the Senate Appropriations Committee who have drafted followed

airlines but have been seen to be split to provide Raytheon. Many studies point out at Ray in flight in five or six hours. Raytheon's split alien was developed in flight rocket function as conventional

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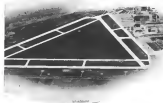
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FIRST DELTA-WING to fly, Convair 7802 (left) shows how a plane of this configuration must take off at a very steep angle (right).

How Delta-Wing Aids High-Speed Flight

Unconventional planform combines advantages of low aspect ratio and sweepback, both reducing drag.

By Robert McFarlane

Although it is now more than four years since creation of hostilities in Europe, U. S. and British aerodynamicists are still exploring a wide variety of ideas developed by German scientists during the war.

It is now apparent that since the beginning of 1944 researchers in Germany carried out experiments were convinced that supersonic flight was possible. Accordingly, by far the vast majority of these work from that time to V-E Day was concentrated on problems of high-speed flight.

Drag Reduction Stalled—By the end of the war the Germans had clearly defined these problems and proposed the basic solutions. In the mean time, at least, they had already attacked supersonic speeds and were well along with solutions for photosupersonic flight.

Avoid from obvious problems of providing suitable powerplants, major problems in the achievement of supersonic flight were reduction of drag and provision of lift. Because dynamic pressure at supersonic speeds is so great, lift coefficients need not be large, and the plane was had made in favor of the most serious difficulty of drag reduction.

Dani Arzeno—They provided two solutions to this problem, both working equally well independently, and even better when used in combination—wing sweep and low aspect ratio. Efficiency of these two solutions is now well known. Not only have U. S. and British laboratories compiled extensive data on these

planform configurations, but numerous craft are now flying using either or both.

The "delta-wing" combines both these solutions into a single planform to produce a triangle shape resembling the Greek letter Δ . Although it combines the two most important of drag reduction, the delta-wing is useful only in the special case of very high speeds, since flight at lower speeds can be accomplished more passively by moderate sweep and aspect ratio.

Much Faster—Generally, angle of sweep is determined by the maximum Mach number at which it is desired to fly without excessive drag, assuming, of course, adequate power. The faster the design speed of a proposed plane design, the greater must be the sweep angle. For Mach 3.5, the sweep angle must be greater than 45 degrees. For Mach 3.6, sweep must be greater than 50 degrees.

To obtain a low aspect ratio (1 or less) with a practical delta wing, it is desirable that leading edge sweepback be 45 deg or more. Hence, the delta wing planform finds its most suitable range of application as aircraft operating at speeds greater than Mach 3.5, having leading edge sweepback greater than 45 deg and aspect ratio less than 1.

History

The proposal for a delta-wing planform originated with Dr. Alexander Lippich, well-known German scientist. He was long associated with Deutsche Forschungsanstalt für Segelflug in the design of tailless gliders during the period of the war with Germany,

which forbade powered aircraft.

During World War II, he was associated with Prof. Willy Messerschmitt in the design of the Me-163 Schwalbe rocket-powered fighter featuring sharply swept wings and no horizontal tail surface. Shortly after completing one such wing on that project he was made president of Luftfahrtforschung. When an aerodynamic research laboratory was set up in Vienna, there he developed his ideas concerning supersonic aircraft design.

Lipke's Delta-Wing—Obviously, enough, his studies on the subject came to a by-product of his permanent service as the team graphics chief, or model engineer. When his popular aerodynamics had passed the wind tunnel and flying model stage, Lippich began design of a supersonic research plane to test his principles.

That aspect, the L-17a, had a delta wing planform with leading edge swept back 60 deg. The rocket engine was built integrally with the wing center section and was to be operated by remote control.

Wing's Features—The plane was to weigh 5500 lb. and had an estimated speed of 3200 mph. It incorporated a number of interesting design features, including an elliptical airfoil section (to maximize transonic stability problems).

There was a gap of about three years elapsing between wing leading edge and control authority (to permit large control surface movement without the danger of stall) due to the shock wave formation on the leading edge and ending far downstream of the airfoil section and wing sweep planform to isolate the heat of the engine.

► **Initial Tests First**, a model was tested in the Götting high-speed wind tunnel up to Mach 2.6. These tests showed the design to have integral stability at high speed and a highly efficient viscosity at low speed.

Consequently, it was decided to build a glider version for stability investigation. This was designed by the Flugtechnische Fachgruppe Darmstadt and completed July 14.

► **Glider Test Flown**—It was built of wood and fabric, and carried a pilot in the center section, his seat was centered on the leading edge. It was to have been carried aloft on the back of a Heinkel biplane light transport and released at 25,000 ft.

Small wire tracks provided changes in trim and a rocket motor could be used for high-speed dive testing.

Tests were never made, however, and the glider was ultimately brought to this country.

► **First Delta Wing Flown**—The next delta wing airplane (and first to fly) was not completed until five months later, but followed closely the general design concept of the 3, 1, 1. The Convair Model 7002 made its first flight June 9, 1948 for a five miles at a height of only a few feet. Its first endurance flight was on Sept. 10, 1948. Both tests were at Muroc Air Force Base, Calif.

The design differs from the Lippisch in that it has a fuselage housing the pilot and powerplant and a thin, airfoil-shaped wing. Tests flight are outstanding with the Model 7002, but no tests are yet available.

Thus the history of the following configurations is still uncertain—made up only of proposals and extensive wind tunnel tests in Germany and a few flights of a design built in the U. S. on the basis of these data, supplemented by wind tunnel tests of the Aeronautical Laboratory of the National Advisory Committee for Aeronautics. But these data together with greatly accelerated theoretical calculations provide sufficient information on which to agree this new and promising supersonic planform.

Lift and Drag

In addition to low drag, the delta wing exhibits the unique characteristic of sensitivity to lift coefficient changes with Mach number.

For example, the rectangular wing experiences a 50 percent increase in lift at Mach 1.5 is approached an 80 percent increase in supersonic flow is established and a rapid deterioration of the lift with increasing Mach until it has dropped about 70 percent below its subsonic value at Mach 3.0.

In contrast, the delta-wing at low aspect ratio produces the same lift throughout this entire range from low

subsonic to high supersonic speeds.

► **Lift Coefficient**—First, the high lift/drag characteristic, the lift coefficient of the delta wing is considerably lower than that of a rectangular wing.

For example, from hydrodynamic theory, the lift coefficient of a conventional subsonic wing may be expressed $C_L = \frac{1}{2} \rho v^2 \frac{A}{q}$, where ρ is the density of the air, v is the velocity, A is the area of the wing, and q is the dynamic pressure. For a very slender delta wing gives a value of the lift coefficient $C_L = \frac{1}{2} \rho v^2 \frac{A}{q}$, where A is aspect ratio.

Since this approximation is valid only for very small aspect ratios, at a ratio of 2 the equation will have a value of $C_L = \frac{1}{2}$, which is only half the value of the conventional subsonic wing, given above.

A further approximation is obtained by integrating the pressure over the upper and lower surfaces, and the resultant $C_L = \frac{1}{4} \rho v^2 \frac{A}{q}$. Inspection of this equation indicates that it is higher than the conventional wing only at high supersonic speeds (up to Mach 2.2) but grows progressively lower as Mach number is increased.

► **Drag Analysis**—The low drag of the delta wing is its preoccupation and is made up of conventional friction drag, wave drag and drag due to its production of lift.

In general, friction drag of the wing will be of the same magnitude as the thickness drag, one of the terms in the wave drag. In the absence of test data its value is usually assumed at something less than 1/44 with a value of 0.008 being reasonable.

To this must be added the wave drag which has been the subject of extensive theoretical study. The equation takes the same form as the lift coefficient plus the addition of thickness drag, increased above $C_L = \frac{1}{4} \rho v^2 \frac{A}{q}$ ($\rho = \rho$), where ρ is wing thickness divided by the chord. This may be written as $C_L = \frac{1}{4} \rho v^2 \frac{A}{q} + \frac{1}{4} \rho v^2 \frac{A}{q} \frac{t}{c}$, clearly isolating the drag due to the thickness ratio.

► **Supersonic Conditions**—At supersonic speeds it is customary to divide the drag into two parts—a friction drag and an induced drag, the latter produced as a consequence of lift. At supersonic speed, drag due to production of lift can no longer be called "induced drag," since pressure changes in the trailing vortex cannot propagate forward and influence flow conditions.

The drag due to the lift at supersonic speed is a complex function which will not be repeated here, but it is proportional to the square of the lift coefficient.

Because drag of a delta wing at supersonic speed is proportional to the square of the thickness ratio and the square of the lift coefficient it would follow that

low drag is obtained when both thickness ratio and the lift coefficient are low.

However, use of an extremely thin wing, poses, in addition to structural considerations, an interesting aerodynamic problem.

► **Leading Edge Action**—Since the delta wing leading edge is swept behind the Mach cone at moderate Mach numbers, an infinite velocity cone around the leading edge, the case is that instead of striking the Kármán-Johansen condition to subsonic flow.

If the leading edge is rounded, this infinite velocity is reduced to a large, but finite, value, pressure is reduced at the leading edge and a reaction force is created. The reaction force is sufficient to lift the wing to be reduced forward relative to the third plane, and the drag due to the lift is reduced proportionately.

Thus a sharply pointed leading edge risks the delta-wing of this induced thrust. Requirements for systems that can be discarded, in conflict with that for an adequately rounded leading edge.

It is interesting to note, however, that Lippisch used an extremely graceful leading edge radius of curvature on his delta-wing glider, although it is not known whether he had discovered the aerodynamic reasons for such a configuration at the time.

Stability and Control

It is now well known that the slope of the lift curve is reduced by isolation in aspect ratio and by increases in wing angle. This indicates, of course, that the angle of attack required to obtain a given lift coefficient is increased proportionately.

Delta-wing airplanes, then, require very high altitudes for landing and takeoff without distances compatible to those for conventional aircraft.

These altitudes need not be used when sufficient runway is available for the takeoff and, because of other considerations to be shown, prove easy, and probably will be used in landing delta-wing aircraft to reduce the attitude for touchdown and provide self-rest energy for the flare.

► **Stability Considerations**—In general, the delta-wing, pitching moment is stable as long as its aspect ratio is held quite low. This requires that a 45 degree delta-wing have an aspect ratio not greater than 3 and a 60-degree design an aspect ratio not much more than 1.

This stability holds true up to the stall, although experimental data are available in the region of the stall. At this point, the low damping in roll of the delta-wing becomes a real consideration and some would tend indicate actual deterioration at the stall due to this characteristic.

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little turn motion, marginal load-factor results at the tail, particularly in extremely high degrees of attack.

One of the difficulties of predicting low-speed delta wing behavior is the unpredictable effects of flow separation at high angles of attack required by the tail. These angles may often have values as high as 40 deg.

► **Low-Speed.** Delta-Span winging results of low-speed tests of delta wing planforms are available from captured German reports of work done at DVL.

These data show a strong lateral flow development over the rear of the wing moving towards the tip. Since this flow results in low pressures, lift is increased.

This increase in lift at high angles of attack produces a positive control deflection in the lift curve and the slope actually begins to increase from $C_L = 0.9$ as up.

This flow also produces a reversed shift in the stall point, the lift and thrust at which the wing begins decreasing with decreasing aspect ratio and increasing sweep angle.

A further result of this flow is a paradoxical increase in $C_{m_{ac}}$, with decrease in $C_{m_{ac}}$ with increasing aspect ratio.

► **NACA Results.** Although extensive test data on delta wing planforms has now been compiled by NACA, the new unclassified results mention only data on a single loading 63.4 deg. overcrank on the leading edge, aspect ratio of 2 and an NACA 0012 section. The same section used in the German three tests, previously outlined.

These data show a maximum lift coefficient of 1.2 at an angle of attack of 35 deg. But of more interest is that this lift coefficient was attained at a point about 40 percent of the span span outward of the longitudinal centerline. Maximum lift coefficient obtained at the outboard was only 1.05 at an angle of attack of 45 deg. The illustrates one of the important practical characteristics of the delta wing, its wide variation in span load distribution with angle of attack at low speeds.

In these tests movement span loading coefficient moved outward from the outboard (at 45 deg.) to a point 60 percent of the span span at 35.7 deg. and then moved back inward again to the outboard at the stall.

Control effectiveness moved inward with angle of attack, from 824 percent span span at zero deg. to 76 percent span span at 45 deg.

Throughout these tests, however, the wing center of pressure remained too near longitudinally at about the 40 percent span spanwise chord location.

► **Tip Stall.** These data indicate that deeper outer spanwise, the delta wing is subject to the tip stall propensity

which is common manifestation of the problem in all winged since its greatest lift distribution is theoretically located along the leading edge and tends to a very low value at the trailing edge.

This theoretical distribution is only modified slightly in practice (lower relative velocities are referred to high but finite values), resulting in the phenomena which at the top forward the tip, coupled with the low damping in tail, combine to create serious low speed stability problems which will undoubtedly require high power loading, mechanical assistance.

► **Reynolds Number.** Data—Results dealing concerning the low speed stability of delta wing planforms are expressed on the basis of adverse Reynolds numbers often. An NACA study of captured German reports, together with Allied and U.S. data, indicate that although at low Reynolds number higher maximum lift coefficients were obtained for moderately swept-back wings than for unswept wings of similar planforms, at high Reynolds numbers, however, increasing the sweepback decreased the maximum lift coefficients.

The study showed that effect particularly marked for delta wing planforms. It was on the basis of these studies that the decision was made by the Air Force and Convair to delay the final design of the XF-92 until a wing root model, the 7002, could be built and tested to provide high Reynolds number data.

► **Control Surfaces.** Problem of the location and planform of control surfaces on a delta wing has undergone extensive theoretical and experimental study but much remains to be done.

Use of delta-shaped control surfaces at the tips of the wing shows promise with use theoretical study indicating that for the conventional control surface chord to span root chord, the triangular surface produced a rate of roll per hinge moment coefficient twice that of a two-dimensional airfoil.

For the case of a conventional full span, unswept-back control, the air which are not yet clear. Although the study indicated that the lift produced by a swept control deflection was actually greater than the lift resulting from a swept angle of attack, the latter wing, this is probably a result of the low lift curve slope of the wing previously described, rather than control effectiveness.

For the case of partial span surfaces, either inboard or outboard, the reaction of their effectiveness with Mach number leaves little to choose between the two although the study indicates that high aspect ratio control surfaces have the more important characteristics at supersonic speed as do those at subsonic speed.

One of the interesting possibilities of providing control and lift to a delta wing to support swept-back lift distribution at supersonic speeds is the use of a pulsed jet, which was first revealed at the 1948 inspection of the NACA Langley Aeronautical Labatory.

Whether the jet surface delta wing has a U-shaped jet distribution when viewed in the plane of the wing, a lift distribution can be given by varying the plane of the wing upward and outward from the centerline. Various degrees of sweep can be used to provide the required lift distribution. While these offer interesting theoretical possibilities, structural considerations make them impractical at this time.

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Study Corrosion In Rocket Engines

Causes of corrosion in rocket engines are currently being investigated in a program initiated by the Engineering Division of the Air Material Command in cooperation with Rocket Motors, Inc. Causes are in progress investigation in the Air Force XLR10-BM-1 rocket engine.

Components showing indications of corrosion are nozzles and access areas. When present, corrosion causes surface erosion, pitting, and cracking, which, in turn, may lead to failure of the engine.

Study has shown that use of carbon standards for cleaning in the field is one reason for corrosion. Rocket Motors found that many corrosion problems were eliminated by discussing the use of the cleaning fluid at the plant.

Investigation has indicated that corrosion occurs in inaccessible parts of rocket engines where fuel has become trapped. Parts usually affected have been pressure control switches, fuel inlet check valves, and igniters.

It has been determined that this problem is helped considerably by using inhibitors in fuel and by paying more attention to the cleaning of the engine during dry out rather than wet out.

Another reason for corrosion may be use of regular tip water in the alkaline water system used for fuel. Laboratory tests are now being made to investigate this condition. However, major factor is believed to be electrolytic action at contact points of dissimilar metals in the presence of the water alcohol mixture, both in the liquid and in the vapor phase.





MAGNESIUM ALLOY countermeasures applied to Lockheed F-80 wing panel indicate design simplicity attainable. By comparison...

Magnesium Used As Structural Material

Redesigned F-80 wing reduces pieces to 31 percent and fasteners to 38 percent of aluminum alloy wing.

By J. P. Donald Gorges*

Another step toward universal acceptance of magnesium as a primary material in aircraft construction is nearing its end.

The metal has been successfully used as a skin material many times, but largely due to lack of full understanding of all its properties it seldom has been considered as a primary structural material. But that situation shortly may be changed.

In April, the Aircraft Laboratory, Air Materiel Command at Wright Field, gave approval for use of magnesium in primary structures for all types of aircraft including high speed fighters. Previously it was an approved basic structural medium only for trainer types. This gives the way for the first step design and construction of magnesium alloy aircraft test aircraft.

Ultimate weight savings in use of magnesium are not substantial. But there are other factors—advantages—advantages from basic wing skins, lower parts with resultant savings in man hours and fabricating time.

New and Growing.—The use of magnesium alloys as primary aircraft structures is a relatively recent development. We at East Coast Aeronautics have been indoctrinated in the advantages of this material during one design and development of magnesium alloy wings for the F-80 airplane for the USAF Air Materiel Command. A similar project is

winning the design of a thick skin magnesium alloy wing for a jet fighter being produced for the U. S. Navy, Bureau of Aeronautics. Under contract, his given no further experience.

Magnesium is a state of rapid development. The magnesium wing for the F-80 and the Navy fighter incorporate in present materials and techniques previously not achieved. An example is the employment of the new air cushion alloy (ZK 60) having greatly improved strength and ductility and yet a notch sensitivity comparable to 143T.

Low Weight.—The low specific weight of magnesium accounts for its chief structural advantage. A high strength-to-weight ratio of the material is in the direction for which composite building is a critical condition and the most effective means of boosting allowable compressive stress is to employ that composite.

Consider these pieces of steel: (1) suspension (2) aluminum and (3) steel. Assume that each has the same unsupported length and that each weighs the same. The suspension will be approximately 70 percent thicker than the aluminum and 91 percent thicker than the steel. It will be 2.5 times as stiff as the steel.

This low specific weight is particularly interesting in present design as a factor in the elimination of sheet stiffeners and formers and thereby permits simplification of the structure.

Disadvantages.—The magnesium alloy

as at some disadvantage when compared to alloys of aluminum and steel in the line of shear strength. That must be recognized as design factors in providing more liberal margins at edge corners, around holes for fasteners.

Another structural disadvantage of many of the magnesium alloys that must be given consideration is its notch sensitivity. Poor notch sensitivity is particularly associated with castings and extrusions that have been both hot-treated and aged. Unless a finished member is of such shape as to be notched free of these concentrations it is well to make some selection of high yield strength in the direction of a notch and heat treatment.

Fabrication.—Fabrication of new structural magnesium cast parts people be considered apart from design technique. The design must have a full appreciation of the possibilities of the material in relation to conventional methods of fabrication. The shop must also be familiar with the advantages and limitations of the material and must apply its experience in the development of new tools and techniques.

Practical men have also reacted to the introduction of new structural materials and tended to magnify the difficulties encountered in their fabrication. The cost of such an effort appears as excessive in comparison to contemporary steel construction. On the other hand, during World War II when wood construction had become a lost art it was a viable operation to resort to steel as a substitute for spruce casing.

In design for fabrication, lead magnesium alloy sheet has the same limitations as an iron hardened material. It cannot be stamped out to intricate shapes in the soft condition and then



ALUMINUM ALLOY outcrop has corner piece as relatively thin sheet diffused by T fasteners and clevises. It matches...

usually among by heat-treatment. If a bending or cold forming operation can be done quickly, it is practical to not heat to increase the variability of the material. This can be accomplished with small surface strength.

Heat Effects.—However, a considerable amount of forming must be done, such as a deep-drawn operation, it is necessary to resort to prolonged heating and the fabricated part will have the strength properties of annealed material.

Accompanying graph shows the effect of annealing time and temperature on the mean compressive properties of ZK-60 sheet. These curves were obtained by tests on typical sheet, but due to limited test data they are intended to indicate heat effect only and are not to be considered as typical as maximum values.

The permissible loading temperature is limited to that which will not result in more than permissible property loss. Some operations lend themselves to rapid heating and in such cases where heat as well as temperature treatment can be accurately controlled, higher temperatures can be permitted.

Where annealed ZK-60 or ZK-60A is required to be heat, temperatures up to 900 F. may be used so long as the time is kept to within 5 minutes duration. Usually a temperature of 800 to 900 F. is sufficient for satisfactory heat exposure of large sections such as the F-80 heat treat steps so that no appreciable reduction in allowable strength need be expected.

Available Gages.—Another limitation remains to all areas hardened sheet is that it cannot be produced in extruded heavy gages. Strong magnesium alloy is extrudable only in the full hard temper in gages up to about 1875 in. However, a solution process is not required, hard sheets can be produced up to a thickness of about 375 in. Where a sheet is to be heat to the exterior of a

wing or to a cylindrical or cone shape it obviously is not necessary to start with perfect fusion.

Magnesium alloys show a particular advantage in the case with which they can be welded. Deeper cuts can be made than with other structural metals and smooth finish is more easily accomplished.

Corrosion.—Magnesium alloys castings have several important alloy advantages in relation to design and fabrication.

A considerable looking of experience in friendly pattern to produce reliable magnesium alloy castings.

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It was therefore necessary to obtain approval from AMC to use a magnesium casting.

Low specific gravity of magnesium permits use of thicker sections so that parts which must be intricate stampings in aluminum alloy may be castings in a magnesium alloy.

A strong magnesium alloy casting has about 50 percent of the ultimate tensile strength of wrought magnesium alloy, but is the aluminum alloy that is less than 50 percent.

Extensive piece use of cast magnesium alloy is required to the weight loss has an important bearing in the question of facilities during a national emergency.

F-80 Wings.—Our recent F-80 project is an example of the design possibilities of magnesium alloy structures.

In approaching the problem of designing the F-80 wing in magnesium alloy it was felt that the materials low specific gravity should be exploited in a means of following a thin skin type of structure with all stiffeners and sheet stiffening omitted. In this way a simple, more rugged design would result in an appreciable weight penalty. The Lockheed design distributed the bending loads to about the following proportions: beam caps, 68 percent, skin sheets and stringers, 14 percent.

However, with our thin-skin design we distribute these bending loads in the opposite manner: beam caps, 14 percent, skin sheet alone, 68 percent. A maximum skin thickness of .175 in. is used in place of a maximum thickness in the case of the Lockheed wing of .051.

The beam webs also follow this thin-skin procedure with no cambering during in critical sections, since the thicker web is more characteristic than the thinner aluminum alloy cap.



Effect of anneal time and temperature on mean compressive properties of ZK-60 sheet



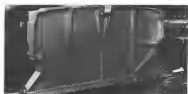
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Wing station 4 highlighted, illustrates one-piece magnesium casting, new reinforced rib building method consisting of 25 parts, 651 fastenings, with small weight penalty.

► **Changes With Magnesium**—The Station "U" bulkhead (which is the most heavily loaded bulkhead and located on the extremity of the wing and air plane) was originally built up design consisting of 25 separate parts and 655 fastenings to hold the parts together.

We were able to redesign this member as a one-piece magnesium casting, thereby eliminating 24 parts and 651 fastenings with only a very small weight penalty. The new bulkhead outboard station No. 30 has now also changed from its original built-up form to a one-piece magnesium casting, thereby eliminating 35 parts and 140 fastenings.

The original aluminum alloy wing consists of approximately 1640 parts and 42,708 fastenings. In the magnesium alloy design we have only 106 parts and 16,000 fastenings. In other words, the magnified design contained only 31 percent the number of parts and 38 percent the number of fastenings as the original aluminum alloy design.

It is impossible to assume that the resultant saving in manhours to fabricate and assemble should follow approximately the same proportions for an equivalent number of parts.

► **Loading and Unloading**—With such an appreciable saving in the number of both parts and fastenings there is a noticeable reduction in the number and type of loading required. Since time was taken to avoid ultimate fastenings, there were no requirements for complicated loading.

An appreciable saving in number of drawings resulted from the simplification of the structure. Drawing these members, like great ribcage and tail fin and flag procedures also were simplified by the saving in parts required.

Although the F-50 magnesium wing design may not necessarily set the pat-

tern for all similar projects, we believe it represents a more or less typical example for that general category.

► **Skins and Webs**—The real advantage to be gained from the use of magnesium is in the skin covering and beam and rib webs. Here the designer can appreciably economize on parts and fastenings and at the same time create a simple, rugged structure.

Thick wing skins present valuable aerodynamic advantages in increasing the wing content of high Mach number airflows. During static test of the F-50 magnesium wing, the skin did not buckle until well above the flight operating range. The additional fact that the thicker skins generally result in smoother surfaces than are possible with the more conventional skin groups also favors the aerodynamic efficiency.

With thick skins, such as were used on the F-50 project (1.55 inches in 56's as the major all of the main beams in the vicinity of the skins) no doublers were required for both roots, mid-chord counterbalancing being possible throughout. This simplified the problem of loading as well as of quality control, similar to root fasteners was concerned.

The maintenance picture with thick skin wing also is noticeably improved by providing rugged exterior surfaces which will permit rough handling in the field, as well as the elimination of cracks around roots due to flexibility. The thick skins and more rugged exterior offers pay off during more crash landings, such as ground loops and landing accidents in preventing damage to the generally vulnerable wings of the more fragile type of structure.

► **Beam Caps**—In the design of beam caps, non-traditional aircraft design techniques are followed. By means of the never magnesium magnesium alloy (ZK-60), which is available in the extruded form, good allowable strengths are obtained with greatly improved notch

characteristics. In the latter report ZK 60 exhibits sensitivity to such factors as 7.55T and approximately the same at 140T.

Where loads of the type may be required, local applications of heat within limits of time and temperature will permit the operation without appreciably affecting the physical properties.

In the F-88 project, the brass caps are contained from tip to tip and must therefore be bent, after machining, for detail and in the case of the front burner for both rear back and shroud. Local applications of 350 F. for 5 minutes permits the cap for the leading section which is done on an anvil press.

• **Flare and Reheating.** In order to provide the necessary of heated dies, as well as the desirable physical properties of partially annealed magnesium alloy, intricately formed sheet metal parts are provided. The sheet metal, heads, with the margins of those available to savings, were designed for built-up construction and consisted of web and extended caps of mean or less cross-sectional area.

Where, as in the case of the burner, use of the heavier gages for web material permitted lower vertical stiffening with a resultant economy in number of individual parts.

• **Fastenings.** In order to simplify fastening procedures and to prevent corrosion, 505 aluminum alloy rivets were used throughout the design. In cases where a shortage of this metal was encountered it was permissible to use other aluminum alloys, even steel that they were dipped in zinc chloride prior to the time of riveting.

In some installations use was made of 7057T Black bolts where driving of the bolts was 505 rivets because the bolt or where this smaller diameter of the Black bolt was desired because of the limited cap area available.

• **Complete Structures.** The F-88 project required the design of magnesium alloy to the limit because of its outstanding properties. Where the requirement is not permanent, the designer can wish to use a composite type of structure, using magnesium alloy where it will contribute most and aluminum alloy where it will be most effective.

From the present discussion it would seem that 7.55T or 145T or, because weight, be substituted for brass caps and heavily loaded riv caps, and magnesium alloy, used for skin covering and for boxes and rib webs. However, it would be advisable to investigate the structural behavior of the composite structure in order to arrive at satisfactory dimensions for such a design.

► **Additional Components** — Composite

such as addition to the wing which are adaptable to magnesium alloy design are:

- Wing Tips
- Ailerons
- Flaps
- Fins
- Landing gear doors
- Miscellaneous fairings and fixed equipment items

In the design of wing tips, fairing fins, deep drawing and possibly welding are likely to be utilized. The very limited forming properties of magnesium at elevated temperatures will be appreciated by the designer and no special die features should be incorporated in either the design or fabrication of the skin.

The magnesium alloy flap or aileron design could probably require heavier than gages. For the same weight per square foot, magnesium skin can be 30 percent thicker and 150 percent stiffer than aluminum alloy which is required. The resultant structure will have considerably fewer parts because the thicker section will require a less elaborate system of stiffening.

It is suggested that the designer avoid excessively formed sheet metal parts in order to provide the expense of hot forming as well as the desirable physical properties of the partially annealed magnesium alloy.

In the design of a magnesium alloy fuselage structure, the low specific gravity of magnesium will permit the use of substantially thicker skin gages and reduce the number of longitudinal stiffeners and frames.

Magnesium structures for stabilizer, fin, elevator and rudder allow follow in general the design technique discussed for the wing, although the flap that is thick, stiff and a simplified structure.

• **Control Needles.** The metal needles followed during the introduction of the new, artificial, as design technique must embrace, be evolved when designing magnesium alloy control structures.

However, if one is taken by one another deep equipment and performance (although) in the original design, it will be found that the transition period in changing production from aluminum alloy to magnesium alloy components is a short and comparatively simple one.

By exploiting the low specific gravity of magnesium to permit heavier gages and the elimination or reduction of stiffeners and fairing areas, considerable savings can be realized in Engineering, Tooling and Manufacturing and at the same time a stronger, more rugged structure will be produced at a savings only in weight.

Advantages Claimed for Silver-Zinc Cell

A lightweight anhydrous electrolyte, which runs on a silver electrolyte, exhibits interesting potential as an aircraft battery, claims.

It reportedly makes possible development of a battery, 4 in. by 4 in. by 4 in. and has low self-discharge rate. Perfected by French physicist Henri Andrieu, who developed it at its present state, the cell is made in the industry, under license, by Silver-Zinc Corp., 50 Riverside Blvd., New York, N.Y.

According to the manufacturer, the cell already has been tested by one of the Services, which has placed an initial contract.

Although the silver-zinc cell is not new, it is claimed that the present unit is the first to be rechargeable.

The maker states that, in addition to small size and light weight, a battery incorporating this silver-zinc cell would have these advantages:

- Electrolyte is absorbed, not drawn off during charging.
- No danger of overcharging, since electrolyte does not bubble.
- Excellent resistance to acid fumes, and absence of leakage.
- Long shelf life.
- Mechanical ruggedness and resistance to shock and vibration.

The company believes that the higher cost of a silver-zinc battery would be offset by savings in weight and space.

It points out that the standard lead and storage battery, rated at 65 amp. hr. and 12.5 volts, weighs 65 lb. and occupies 955 cu. in. It is claimed that an equivalent silver-zinc battery, having the same amp-hr capacity and voltage, would occupy 490 cu. in., weigh 16 lb.

Oil Foaming Reduced By Charcoal Column

A step toward eliminating oil foaming in engines has been advanced through a contract awarded to Stanford University, according to a report prepared for the National Advisory Committee for Aeronautics and presented by U. S. Dept. of Commerce office of Technical Services.

An oil problem in the operation of internal combustion engines, known as oil foaming, reduces lubricating efficiency.

Experiments, financed by NACA showed that oil can be separated from fuel by passing through a column of activated charcoal.

An aircraft-type lubricating oil, was subjected through the column at 90 C.

or higher, then circulated through engine at 100 C. It produced only 1/10 the volume of foam as compared to untreated oil.

Activated magnesium metal, silver and Precor, when passed in solution for separating, also defoamed oil, but not to same extent.

Extraction of oil with liquid sulfur dioxide, phenol or acetone solution hydrocarbon failed to produce any equal result change in tendency to foam.

Use of heavily de-aired acetone, diethylene glycol, followed by filtration, also was unsuccessful.

Deposits formed on the charcoal during foaming, little or no loss in viscosity, the nature of the action, or the contaminants responsible for foaming. The report recommends further studies on the subject.

Technical Note 1545, on this subject, titled "Attempts in Deaeration Using Oil by Precor," may be obtained from NACA.

Sight-Saving Program Aids Plant Workers

An eye-care program started in leading industrial lines during the past year in paying big dividends, according to the American Optical Co.

Over 2,500,000 workers—ten percent of the nation's industrial labor force—are benefiting from this program, which has been aided by American Optical's development of a portable sight-screening instrument.

The instrument can be utilized anywhere in the plant by industrial ophthalmologists or optometrists in charge of program, to check 14 important vision functions in a few minutes.

If the check indicates need for visual correction, workers are urged by companies to seek professional attention in leaving vision to highest possible level. These eye examinations jobs are provided with safety goggles, and if vision is deficient, with permanent glasses.

Program also features establishment of eye protection standards, devices to insure that protective devices are properly fitted and kept in good condition, and recommendations for improvement of environmental conditions affecting vision, such as contrast illumination and elimination of glare.

Precisely every type of industry, has adopted the new safety and visual correction program for its plants in the metal working, chemical, electrical, transportation equipment, public utility and other fields.

Recent reports from plants revealed that, on the average, one out of every three better workers needed corrective vision. It's reported that program has greatly reduced eye accidents.

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PRODUCTION

Formula for Export Plane Sales

Berch export manager, after European survey, calls for aggressiveness, follow-up, service and financing.

The dollar shortage isn't the only reason some U. S. aircraft are not being sold in Europe. A seasoned aircraft export manager recently returned from Europe says that sales can be made in America's aircraft markets—but in some cases they have to change their tactics.

According to E. S. Safford, export sales manager of Beech Aircraft Corp., here's what U. S. aircraft exporters have to do:

- Be assertive, aggressive.
- Provide constant follow-up.
- Offer additional services.
- Arrange for financing and servicing of the equipment.

Accuracy, translatability and surplus dealers have done and continue to do a very important job. But, Safford tells Aviation Week, "In my talks with aviation people in Europe and Scandinavia, I found that U. S. aircraft exporters as a whole have not been too aggressive in attempting to develop markets in those areas since the war."

"While certain U. S. manufacturers have representation in Europe, few have real industry representation there to their own use in the spot sales work, other than in connection with distributorship agreements."

• **European Staff.** E. S. Safford doesn't mean that the trade is all with the manufacturer. There are high duties, import restrictions and availability of

supplies planes. The dollar shortage is still acute and the underlying difficulty, despite the weakness of the Marshall Plan aid.

ECA has had a tremendous influence in Europe, Safford says, and few American firms have not had the opportunity to personally using the results. "Generally opposite the effect this program has had not only on the economy of Europe, but on the general economic health of the entire capitalist system of the world."

• **National Trade-In.** In great part due to the Marshall Plan, the general economic condition of Europe is better than the Berch representative expected. Europe is recovering, and that brings another competitive problem. It is national pride.

U. S. business men abroad generally have found that most European nations would prefer to buy and sell among themselves because of a closer community of interest. European aircraft firms now are getting back into production and have their own products to offer. Here's how Safford views that competitive angle.

• **No Personal Market.** "Major airlines for aircraft products in Europe are the airlines and the military establishments. Most aircraft industries now operating in Europe are geared principally for military or airline production. Very little emphasis has been put on the general

market (as opposed to the fact that this market has not come back in Europe since the end of the war).

Apparently the fact that the British and French industries have been so successful has in a certain degree hampered their efforts and another country has produced many aircraft that can be considered competitive to American products. There are, of course, exceptions such as the de Havilland Vampire, which is extremely popular throughout Europe."

• **Cost Factors.** U. S. manufacturers have a big plus in their sales efforts abroad, partly due to greater and volume Safford points it out. "The industries in the underdeveloped countries such as Holland and Switzerland, are handicapped by lack of production volume which can be anticipated for any one model. Retail is that even when good designs are developed, the per unit cost of production becomes almost prohibitive."

"The only advantage such nations having provided is acquisition of aircraft with local funds, plus the security which a local industry provides as a source of supply. From our discussion I believe that these countries will welcome a military equipment standardization program such as the Atlantic Pact will offer, as this should mean a considerable reduction of the per unit cost of aircraft."

• **New Thought.** "But if U. S. aircraft firms are to be successful under the Pact, Safford feels the conventional procedure of retention within design should be changed. His proposal, some features should be presented to agencies with the industrial nations. He thinks it could be done, without upsetting standardization plans, under a formula to insure interchangeability of parts and equipment."

That idea, Safford thinks, has two great advantages: it "would reduce the Air Force's complex administrative and procurement problems," and it "would promote the individual design of the respective participating nations by permitting them to handle their own acquisitions rather than carrying on such acquisitions through the procuring agency of another country's air force."

Overall, Safford would be about the same Safford says, and the assurance could be better as it would enable different factors, because of some common provided by factors and organizations.

Union Rivalry

Seething animosity over Boeing Aircraft Co.'s 15,000 workers at Seattle Wash., the two principal unions involved each have 19 representatives taking 14 hours a day to prepare for National Labor Relations Board election.

The organizers have recently been active in the plant and union activities with the company, which also has set up a schedule providing representatives of both unions being in an open department at the same time.

Not more than one organizer is permitted in any department at one time and none are permitted to use hand tools or other written material. The organizers would talk with one worker at a time but, in cases where there are more than a job would stop in each group, he is allowed to talk to the group, usually three or four employees.

The campaign is between District 751, American Mechanics, affiliated with the International Association of Machinists (independent) and Local 451, Aeronautical Workers, affiliated with the A. F. of L. and the Joint Council of Teamsters.

PRODUCTION BRIEFING

• **Air Associates, Inc.** has been appointed distributor for Transair at crash speed racks and clips. Air Associates will handle Transair products

through its office in Los Angeles, Dallas, Chicago and Philadelphia, N. J.

• **Boeing Aircraft Corp.'s Pacific division** has begun work on a new plant in North Hollywood, Calif. It will be used to make individual fuselage segments.

• **General Electric Co.** has received a contract of \$1,000,000 in its original \$5.5 million USAF contract for aircraft for control systems to be made at its Westbury, N. Y. plant.

• **Hamilton Standard division of United Aircraft Corp.** will furnish a specially tailored version of the 41000 reversing Hydromatic propeller for the 20 new Lockheed Model 749 Constellation purchased by TWA.

• **Thompson Products, Inc., Cleveland,** will get a license on the "three rotary process" for casting superalloy metal and ceramic metal parts as part of an production program on metal and turbine blades for aircraft jet engines. Process was developed by Edward J. Kohl of Mueser Corp., Cleveland.

• **Wright Aircraft Corp.** plant in Wood Ridge, N. J., will be closed for an annual vacation period during the first two weeks in August.

• **Aviation Aircraft Ltd. of Toronto** received a \$100,000 order from the Egyptian Government for 24 C-47s, training planes. Earlier this year the Indian government ordered 45 C-47s.

• **Grady Systems, Cincinnati** will use an adaptation of the Goodyear Hawley termite dust brake on its engine components. The Hawley brake will be built under license from Jesse G. Hawley of Corning, N. Y., who also licensed Grady to build the type of brake for aircraft.

• **Wright Aircraft Division, Boeing Co.,** at Los Angeles now has a backlog of \$400,000 in modification work on Constellation for Continental Oil Co. Thompson Products, Franklin, Ill. and Spauld Corp. and Oil Co.

• **TINCO—Tucson Engine and Manufacturing Co.—has designed a new three-piece engine for its military type TE-1A tandem tractor.** The new engine is made of Douglas with a magnesium alloy frame.

• **Northrup Aircraft Inc.** has arranged a new \$5 million long term credit contract with the Reconstruction Finance Corp. for the financing of future production work. Loan is expected to be liquidated within two years.

How Big Is the Propeller Industry?

First definite indication of the size of the aircraft propeller industry in the U. S. is given in a new report of the Bureau of the Census and the Civil Aeronautics Administration, covering the year 1945. Data for the table below were gathered by the Industry Division of the Census Bureau from 15 companies, all of these known

to be manufacturing propellers.

In December, 1945, these companies employed 12,485, divided between 7,657 production and related workers, and 4,828 other plant employees. Employment was relatively stable throughout the year, few being 1925 as March, and high, 11,755, in November.

Shipments of Propellers and Other Products—1948

(\$000's omitted)

Air products total	AIRCRAFT PROPELLERS AND PARTS								All other products
	Total	Military			Civil				
		Total	Propellers	Parts	Total	Propellers	No. Parts		
Jan.	\$5,430	\$5,781	\$1,750	\$1,483	\$274	\$1,893	\$629	1,893	\$2,478
Feb.	5,880	5,950	2,581	2,025	512*	813	400	1,638	365
Mar.	7,671	4,684	3,025	2,758	266	734	3,340	383	3,957
Apr.	7,668	4,264	3,848	3,408	500	3,286	736	3,557	438
May	7,484	5,366	3,981	3,323	663	3,988	598	2,323	488
June	7,421	4,732	3,556	3,473	846	1,187	719	3,373	367
July	7,759	5,597	3,935	3,539	3,976	953	713	2,971	312
Aug.	5,945	3,581	2,769	2,693	562	862	400	2,263	308
Sept.	6,978	4,180	3,132	2,345	1,360	1,097	528	1,881	517
Oct.	7,346	4,719	3,281	2,225	1,064	1,462	1,499	477	3,507
Nov.	7,336	4,688	3,086	2,386	698	742	889	317	2,559
Dec.	8,348	4,880	5,794	2,775	929	1,188	605	732	423
Total	\$52,206	\$52,002	\$37,982	\$38,319	\$8,693	\$13,693	\$7,353	21,994	\$4,729



COPTER PRODUCTION LINE

United Helicopters, Inc., production line, now turning out three Bell 47s a week, is shown at the company's Falls Ales, Calif.

plant. The craft with its 15,000 Falls Ales plant employs over 115 persons. Nearly 91 percent of the output is subcontracted.

NEW AVIATION PRODUCTS

Fuel Filter Cloth

For filtering jet and diesel engine fuels and other chemicals, metal cloths manufactured by Michigan Wire Cloth Co., 2380 Howard St., Detroit 16, Mich., is available for applications where fine straining action combined with free flowing qualities are essential. Designated as specification 8706, metal cloth is used in carburetor filters of very fine particle retention and available flow capacity with strength and corrosion resistant qualities. It is available in Metal mesh and Chemical "C" and is used in standard order in various alloys, including stainless steel and high nickel alloys. Cloth was developed at University of Michigan and Detroit Testing Laboratory under a 510 research program sponsored by manufacturer.



Fold-up Vehicle

For portable first aid units to carry three men of ground transportation with them in the plane, 40-lb. portable "Rescue Cab," made by Regis Mfg. Co., Columbus, Ill., can be collapsed to fit into baggage compartment of small craft.

After landing, vehicle is unfolded and ready to carry emergency adult at rate of 30 mph. It is folded down and set up about 100 lbs. on pillars of gasoline and one is unfolded or collapsed in few seconds.

Unit is powered by lightweight, high speed, half-horse motor, has automatic clutch, auto brake and tail bearing wheels. Dimensions when folded are 14 x 154 x 234 in.



Pickup Instruments

New line of miniature "Teflight" pickup instruments converting acoustic, static and pressure transmitters to pulse electrical output varying linearly

with imposed modulation or pressure. Output from each unit can be used for remote indication, recording or control signals.

Instruments are offered by Electro Fluke, Inc., N. Tonawanda, N. Y., also manufacturer device under license from Bellman Electronics Works. Company will readily adapt for use in suspended indicators and altimeters on impulse.

Devices incorporate cathodes beam on which free active 30-ohm stress paper are bonded 70 to surface side of focus, and arranged to form four arms of Wheatstone bridge circuit in a manner to produce minimum output.

Powered by a c, with positive signal swing, enough to permit direct measurement of recording phenomena. With a c, they yield output suitable for carrier systems.

Instruments are temperature compensated for both zero shift and sensitivity to better than 11 percent deg. F.

Pressure transducer output in ranges up to ± 100 psi and accelerometers up to ± 500 G. Pressure units are in psi for measuring differential in pipe pressure, or absolute pressure. Accelerometers weigh around 4 oz. with size of 2 x 2 x 14 in. Accelerometers are approximately 1 x 1 x 2 in. and weigh 6 to 8 oz. depending on range. Frequency response of units is 10-1000 c/s depending on range.



Tiny Bearing

Development of miniature R 675 aviation ball bearing, claimed to be smallest unit of its type produced commercially, is now offering new possibilities in fields of instrumentation, radio-astatic motion, laboratory apparatus, testing devices, and other precision bearing mechanism, small moving parts. Distributors in London & Co., Inc., 109 E 43rd Ave., New York 17, N. Y.

Bearing has seven evenly spaced balls, uninterrupted mercury, no filing catch, and comes with separator and double shield.

Designed for radial and thrust loads, it is made of chrome steel and ground on 31 finished surfaces. Outside diameter is 1 mm. (1/16 in.) and weight is .0007 lb. (1/2500 oz.) Ball diameter is .0007 in. (1/1000 in.).

FINANCIAL

Market Action

(Listed Airline Stocks)

Carter	1945-46 High	1946 Low	June 15, 1946 Close
American	15	64	61
Boeing	5	64	61
Capital	47	54	54
Ch. & D. VTC	56	54	54
Colonial	5	5	49
Eastern	51	131	131
Norfolk	41	41	7
Norfolk	41	41	7
Northwest	63	61	74
Pan American	59	59	59
TWA	79	92	114
United	67	91	149
Western	90	94	8

Airline Securities Resist Trend

Carrier shares hit low points late in 1948, now show surprising strength in face of a general decline.

In the face of a general market decline which resulted in new lows for a long time, airline shares have demonstrated definite resistance qualities.

The unusual performance of air transport securities is merely a reflection of the group's own peculiar business cycle. The industry's share was generally at their low point late in 1948 when the cumulative effects of the past's adverse opinions were very much in evidence. The sector at its annual peak occupation was made by the Civil Aeronautics Board were put to come.

With a successful year of air traffic, and with many suggestions of the industry being by higher, most people, however, results steadily became apparent.

Further, as traffic during the last quarter of this year looked particularly promising when compared with the poor last quarter of last year, the industry's showing attracted attention in going counter to a general business trend.

Unfavorable Atmosphere—Even after all evidence for the industrial conditions, traffic continued to make gains during the second quarter of this year, particularly in the face of declining industrial trend. It is thus not of atmospheric quality appears to maintain and questions being for rebuilding industry.

But airline shares previously subjected to one of the greatest price deflations ever experienced by any group in the space of about three or four

months, remain, nevertheless, considerable amount of interest and popularity. By the same token, a declining rate of industrial production lessens the need for movement of personnel and equipment. As a significant qualification to this picture is the strong growth of demand for air travel, it is not surprising. It is this quality which has, in part, the industry to maintain its present position, to run counter to the general trend of declining business.

Analysts—Despite the vigorous activity being demonstrated by the airline group, the individual status and problems of each carrier, are reflected in a list of adequacy in the market action. Of the 13 airlines shown in this accompanying table, five were at least level following the decline of June 11th than that which preceded it of the bottom in late 1948.

Colonial recently sold into new low point, resulting in the complete list of Trans-Canada Airlines withdrawn to control its former customer Montreal New York traffic.

Northwest also made new low, only in its 1948 history, in a result of the concern being expressed in the company's ability to cope with its pending financial problems. At this writing, the CAAB has not approved the pending \$12 million Restructuring Finance Corp. loan.

Boeing and Pan American were off but fractionally from the 1948 lows after the recent selling waves.

Eastern, however, remained in a state of an all-time low point since 1948. Low point, however, such of this current decline is due to the apprehensions because of possible mismanagement of operations as a result of proposed reorganization and the industry's stock ownership of National by Pan American.

National shows the sharpest recovery into 1948 despite minor market weakness, gaining some 35 percent over its 1948 low point. However, National late in 1948 was still being plagued by its strike strike and the company's financial condition was seriously impaired. Settlement of the labor controversy and a series of operational improvements possible with Pan American Airways may reverse the carrier's outlook.

Capital's sharply improved status due to the restructure may pay award and the greater recovery in operations is a result of the same efforts, is estimated to be 55 percent gain of its common stock in 1948 low.

American's complete recovery to all previous passenger transport capacity has been gained, the carrier a definite competitive advantage with comparative results becoming evident in earnings reports of recent months.

—Self Attack

RIVET PROBLEM— Change in light material gages—light loads to heavy loads.

METHOD— What testpiece? What loads? How much time?

SOLUTION— HI-SHEAR rivets!



All aluminum drill 1/2" 40-110 pin hole
Rivet strength 4140
Speed 17000 psi on steel



Use same pin
Rivets used in
Steel 1/2" 40-110 pin hole
The change time—Rivets



Use same pin
Rivets used in
Steel 1/2" 40-110 pin hole
Speed 17000 psi on steel



Use same pin
Rivets used in
Steel 1/2" 40-110 pin hole
Speed 17000 psi on steel

Hi-Shears permit the use of smaller
and lighter riveting equipment—
hence, more speed and less worker
fatigue. Since Hi-Shears riveting is
accomplished with standard riveting
guns and equipment, an
extensive pattern of special single-
purpose equipment is necessary.



parts was aimed at making an airplane which could be produced on a mass production basis without having to tool up to the inch and operate under an only industry mass production ruled rule.

In Detroit, Mich., Junkers Aircraft Co. reports to complete the first 10 production versions of the three-place, dual-control 115hp Japato in the end of July, and hopes to have CAA certified too by that time.

In Hughesville, Md., Wilcoed Co. plans to assemble test flights soon with its 50hp turbocharged dual-control plane, powered with two 75-hp 1-cylinder engines, and designed for extremely low weight wing loading, low cost.

In Avonlea, N. C., Lamer Aircraft Corp. reports it has been flight testing the latest in a long line of experimental "Biplanes," this one a two-place prototype with a 20-hp wingspan and 90 hp engine.

Plans exist on underbodies, powered "jet" wing which is controlled from the cockpit by a lever varied effect of flap, aileron and forward lower control.

In Tyler, Texas, Johnson Aircraft Corp., according to the company that developed the all-metal pinwheel Johnson Rocket, is flight testing a prototype two-place all-metal 187hp "jet" powered plane, and preparing to put it into production.

Three Roadable Aircraft development, the Pylon Amphibian at Danbury, Conn., the Ball Firing Auto at Ball's Bridge, Conn., which have already had considerable flight time—and the Tulsa Aero, which is being tested in flight tests at Longview, Wash., preparatory to flight tests in other regional type aircraft under development.

In Deep River, Conn., Sport Aircraft Co. has completed studies in the areas of experimental tubing wing, its long legs designed by George Sperry. First short test legs of the new two-place 65 hp model have been made successfully in Long Island Sound this summer and Sperry is also working on a new loadable version of the central tube wing aircraft.

Plane Ownership Up

Within leads the metropolitan areas of the country in the rate of airplane to population, CAA reports disclosed last week, with 7.1 airplanes to each 10,000 of population in the area.

However, Ala. was second with 49.6 aircraft per 10,000 inhabitants, followed by 37.7, Alaska fourth with 36.0 and Pa. fourth with 36.2.

The CAA material in a publication titled "Personal Aircraft" showed that aircraft ownership approximately 19 percent were shown in the number of

and aircraft in the principal metropolitan areas and cities of 25,000 and over, from Jan. 1944 to July 1945.

Classifying the metropolitan centers according to interests, as industrial, market centers, and suburban, the CAA statistics showed that the largest gain in aircraft ownership was in suburban centers of 50,000 to 249,999 population.

Crosscountry Flight

First main flight of cross-country pilots across the continent from Portland, Ore., to Portland, Me., which actually was completed without accident or unpleasant incident.

Ten-day flight planes carrying more than 100 small amphibious-Dodge business men, professional men and farmers—in two weeks time covered the continent from sea to sea, traversing 24 of the 48 states and covering 7000 miles.

Route of the air tour provided stops at Salt Lake City, Utah; Kansas City, Mo.; Indianapolis, Ind.; Akron, Ohio, and Lack River, Pa. The return trip was made by separate routes to allow visits to points of individual interest. Most of the fleet stopped at Washington, D. C., en route home.

A special C-47 was provided by Air Security Staff arrangements to carry press and radio representatives at the pleasure.

'No-Bouncer' Gear

New American "no-bouncer" landing gear and "Square Glass" version of the Champion tandem plane for agricultural spraying were demonstrated at recent demonstration convention held at the American Aircraft Corp. Middletown, Conn. plant.

The new also took shape as being made available as Model 7 Champion and Model 11 Cherokees. Kits are being provided for field conversion. The manufacturer stated that the new gear unit has been tested in "water ditch" tests at landing and "take off" is reportedly available to bounce the plane during a landing regardless of field conditions. Light technique in other conditions.

A set of two of the new, also called, and unit is listed at \$75 for a field conversion kit and is supplied on new planes for an additional cost of \$15 as special equipment.

Promoted speakers at the American aircraft meeting included John A. Lawley, president of Lloyd B. Spence, general manager; Roy Brown, chairman; James J. C. White, chief engineer; Ben Brown, general manager; and J. J. Kallala, business manager; and J. J. Vandenberg, Continental Motors service manager.

AIR TRANSPORT

PAA-AOA Merger Hearing Ends

Heet but little light on major issues features long testimony; President holds key to proposal's future.

By Charles Adams

The marathon hearing on the Pan American Airways' proposed acquisition of American Overseas Airlines wound up last night with arguments by opponents of the deal fighting hard to get it as another PAA attempt to finish "doomed" merger. The hearing, previously held on the national circuit by Congress and Civil Aeronautics Board.

Close to an week of heated testimony and comparatively little light on whether U. S. trans-Atlantic air operations would be strengthened—and already requirements cut-by-reducing one leg from the last year there to two in the other hand, that of the PAA-AOA merger, succeeded in spotlighting Pan American's alleged selfish and persistent efforts to kill off an already competing line during the previous period.

President Truman's attitude of the merger proposal still cannot be predicted. Key to the situation is not held by CAB but by the White House.

The President must approve all measures and retroactive decisions made by the Board. And in the past few years the White House has shown a growing tendency to reverse CAB.

Legal maneuvering and the dropped out hearings already have blasted PAA's hopes of getting CAB approval for the merger by the Sept. 11 target date. But despite rumors that the deal would be dropped by means of delay, Pan American's president, John T. Trippe, and American Airlines president C. R. Smith stayed in lock step.

Early testimony-PAA suffered two setbacks even before the hearings opened on May 16. Former CAB chairman James M. Leland, applicant AOA employees fighting the merger, was permitted to withdraw after the proceeding material dealing with Pan American's proposed monopoly he presented.

Consequently CAB's public action and economic staff advanced a plan to strengthen TWA and maintain competitive balance on the trans-Atlantic route should the PAA-AOA agreement be approved. The proposal

would sever Pan American's sound the world link and deprive the carrier of important rights of non-stop in Europe and the Middle East.

Savings Chief-Trippe said that he could not "under any circumstances" accept the condition CAB staff and TWA wanted to attach to the merger "doomed" merger. He said that approval of the deal would not crippling restrictions would sever the government 50 million in mail pay annually and strengthen the U. S. against increasingly serious foreign competition over the North Atlantic.

Pan American felt that Leland was intended to bring the worst hearings case a "trial of all his judges" against PAA.

President Truman, Leland said, was intended to kill the merger by delay and "talking it to death."

In an effort to speed future action on the merger, American Airlines wanted CAB to handle the case without waiting for the hearing committee to prepare a report. Under the report it is denied with, claims that the case will be decided this year after next.

Monopoly Opposed—Approval of the merger hinges on whether President Truman will to a loan capital CAB to force it to make the PAA-AOA merger an American day monopoly over the Atlantic. It is left in some quarters that TWA would be unable to compete effectively with a combined PAA-AOA operation.

President Truman's opposition to the "doomed" merger, dates back to his terms in the Senate.

CAB also it is an asset as being strongly opposed to monopoly. On the other hand, the Board has publicly supported the air transport industry to submit merger proposals which would result in greater efficiency and economy. Only last April, CAB declared that merging must be done to effect the increasing mail pay needs of PAA's and AOA's North Atlantic air routes.

Verbal attacks were launched at almost daily during the extended hearing.

Secret Part Alleged-Trippe said that CAB's public counsel's

statements that he [Trippe] had made a secret agreement in 1935 with British Overseas Airways Corp. officials providing for division of traffic over the Atlantic, in Europe, South America and other parts of the world.

Last of four provisions in the alleged cartel-type agreement called by public counsel provided that both Trippe and his British counterpart would deny existence of the pact if ever questioned about it.

Big Case A. C. Cuthbert, who headed BOAC at the time of the rumored secret understanding, who took the stand to deny it was made. But about the "doomed" deal, Cuthbert said that in 1935 to 1936, testified that the American government heard reports of such a deal, checked with the British government, and was convinced that even if an agreement was made it would lack the official sanction necessary to carry it out.

State Department Warning-Trippe said he could not recall viewing a warning that the State Department secretary of State Elliott advised PAA not to interfere with U. S. efforts to obtain an air transport agreement with the Mexican government. Public counsel said he was told of this incident by "a source."

Eastern Air Lines, British Airways and Western Air Lines have criticized routes to Mexico but have been unable to activate them because of repeated refusals by U. S. Airlines to meet post-pact negotiations. PAA and British officials have indicated belief that PAA's failure was responsible for failure of the talks.

Northwest Deal-The Pan American president denied attempts to trade PAA's Alaska routes for Northwest Airlines' North Pacific link to the Orient. He said his company had never tried to get control of Chicago & Southern Air Lines or Western Air Lines.

"We were approached by Capital Airlines on whether we might be interested in a deal. We told them we weren't interested."

Trippe said his discussions with 1947 with Howard Hughes, TWA's principal stockholder, regarding acquisition of TWA's routes fell through because Hughes' share in the value of TWA's assets was "some far out of line."

According to Trippe, Hughes (whom Trippe had seen several times), originally stated that Hughes' interest was to effect a merger of the entire TWA operation, domestic and international, with PAA, while I was interested only in the ocean and of TWA."

Public Counsel-Hughes, Trippe, declared that meeting must be done in southern California to keep away from the scrutiny from the public. (Press-

ously, American West had reported its own study that more talks were being held. FAA and TWA officials denied the story, calling it "specious and irresponsible."

► **Eastern Transfer**—United Air Lines president W. A. Patterson testified at the FAA's week-long hearing that a year or 18 months ago he had talked merger with Tropic. Patterson said it all started when one of UAL's directors sat next to Tropic at a social function in New York.

Tropic reportedly told the UAL director that Pan American expected to reduce domestic routes in 30-60 days and that he (Tropic) would want this would benefit everybody. Stating there was a possibility of PAA leasing TWA, Tropic then allegedly suggested it might be worth while discussing merger with PAA UAL merger.

The UAL director repeated the conversation to Patterson, who contacted Tropic in New York two weeks later. Patterson declared that Tropic told him he had nothing specific to read. The Tropic talked as Patterson had mentioned a PAA/UAL stock exchange, Patterson said.

► **Thompson, Morgan-Delco** Airlines—David C. T. Woodward testified that a year ago Tropic, having heard of Delco National's recent talks, wrote him (Woodward) in Washington. The FAA President suggested the possibility of a merger. Pan American-National-Delco merger, Woodward said he felt it would be too complicated.



EXECUTIVE CONFIDENT

Woodward, former of Northwest Airlines' last Boeing Stearman production as office in William H. Allen, Boeing president (left), returns a check for \$1.4 million from Coast Airways, NWA president. Woodward (right), Boeing vice president—negotiating and

How to Cut Ground Travel Time

Los Angeles Airways head says helicopters are best solution to problem of slow transit from fields to cities.

Helicopters, not the construction of expensive new runways or airfield highways, offer the fundamental solution to the problem of slow transit time between downtown areas and airports, according to Clarence M. Belton, Los Angeles Airways president.

While helicopters of suitable capacity are available for this type service they will stay up long haul passengers, mail and cargo business for all time air lines and put airports in the black. We will see the full growth and development of the helicopter industry with a maximum impact on the land wing industry, only after helicopters are of actually transport anything other than mail or cargo.

Belton made this forecast in a joint session of the Royal Aeronautical Society of Great Britain and the Institute of Aeronautical Sciences in New York.

► **Surface Delays**—The LAA president pointed out that over 2 million people live in the downtown area of Los Angeles, which is 45 minutes to an hour to surface transportation from the airport. Belton has had cars on field in about \$1,600, he said, "and the business operator is not getting rich."

At present, Belton declared, when a passenger disembarks from the plane

at the airport he usually has to stand around until his baggage is ready and until the buses accumulate a full load. In many instances, the passenger must then transfer to a taxi, with another loading of baggage, and finally enter his hotel—the move involving extra hotel, taxi and other charges.

One reason to this situation would seem to be the construction of facilities on the rooftop of the larger and strategically placed hotels so that helicopters could land and be served with passengers by the hotel porter—put in Los Angeles' case, the hotel porter is now being handled on the downtown Post Office Terminal tower building.

► **Helicopter Fleet**—On the basis of present bus rates, the helicopter fare in the airport would be \$2.50 or 27 cents a mile for two adults. At a cruising speed of 120 mph, the flight would take five minutes.

If this proposition were carried to its logical conclusion, the helicopter would not land on the ground at the airport but on the rooftop of the field's central administration building. The whole transaction would be on a through-fare basis, with no hidden or extra charges or inconvenience.

Belton concluded that a number of major passengers might not use the helicopter service. He noted, however, that there is a good potential, much Los Angeles Airport draws 90,000 passengers monthly based on 175 landings and takeoffs daily.

► **Revenue Potential**—"With 10 place equivalent as airport-to-city, helicopter operations has a potential of \$2.50 a mile," the LAA president continued. "That, of course, is based on a 100 per cent load factor, but as a rule is good for mail and express, which together should be good for about 50 cents a mile."

"So, in general, we look for a gross revenue of between \$2 and \$5 per mile on a 16,000 gross weight helicopter employed on high density short-haul routes. As the routes stretch, the per mile passenger fare will drop. I estimate it would level out at a steady income of between 15 and 20 cents."

Since negotiating mail service with the Sikorski 551s in October, 1947, LAA has carried over 2000 guest passengers. Belton said these people have shown no loss of the helicopter as a vehicle and have asked frequently when it would be open for the service.

► **Costs**—Civil-LAA's operating costs have been cut steadily and during the first quarter of this year were about 96

cents a place mile. The company last month asked the Civil Aeronautics Board for authority to carry passengers as well as the present mail and express (American West, June 6).

Belton believes there is ample justification for commercial helicopter in two categories—one of six to eight three-wheel powered gross, the other roughly double that size. Maximum cruising speed of the smaller craft would be 100 mph, with the larger one cruising at 125 mph.

"A good rule of thumb says be 100 hp per thousand pounds of gross weight. Also, we could figure on one passenger and 200 lb cargo capacity per powered pounds gross weight. These figures might not be hard to live up to, even now."

► **Equipment Situation**—Several U. S. manufacturers, including Sikorski, Bell and Pavesi, have produced safety helicopters in the present 6000-lb class. Although in Belton had an American helicopter in the 16,000-lb category has been flown.

Only major experience in the U. S. with safety-type helicopter tests was conducted by Sikorski Corp. in Boston during the spring and summer of 1947. The company used three-passenger Sikorski 61s to make the three-mile flight from the rooftop of an office tower downtown, landing at Logan International Airport.

For one \$3.00 for the three-minute flight, compared with \$1.50 for the 20-minute bus ride from city to airport. The service was discontinued because of inability to achieve a workable land factor.

Strike Blocks Fuel

A sudden strike of 20 Wills-Blass Corp. gasoline truck drivers at New York International Airport has shifted fueling activities for 15 airports, including one downtown center in LaGuardia Field and Newark Airport.

The strikers—members of Local 515 Teamsters Union, AFL, are demanding higher wages and a shorter working week. But Charles W. Wills, Wills representative, claims the strike is not serious since no station has been held by employees to decide which union represents them.

National Mediation Board has decided that the truck drivers in addition to mechanics, maintenance personnel, and ground service personnel, fall into a single unit for purposes of collective bargaining. Wills claims he has urged the Teamsters to become a candidate along with the Transport Workers Union and the International Association of Machinists for the right to represent the employees, but that the Teamsters have refused. NMB will probably hold an election within the next two weeks.



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1 Jet back from the Berlin Airlift, as time Marine Corps or Navy transport duty, C-54s are serviced at Lockheed Aircraft Service and the engines run up and checked. Then engines are removed, components sent to the shop and the engines checked out for overhaul.



4 At each table, fuel tanks are dropped separately to avoid fire. Strip and seal assembly is done only once dependent on type of solvent.



5 Next, wing control surfaces and outer wing panels are removed. These, also, go to shop for inspection.

Cycle Reconditioning Cuts Overhaul Time

The Berlin Airlift has been the proving ground for many an idea of an airline man that commercial air transport never gave him an opportunity to try. And the lift has demonstrated the possibility of other ideas that airlines are now studying for possibility of adoption to commercial transport.

One of these is cycle reconditioning, typical steps of which are shown on these pages.

Last week, as the Berlin Airlift worked its first anniversary, it was apparent that success of the lift was due primarily to two factors: traffic control and reconditioned parts brought in as unaccompanied efficiency, and peak utilization of equipment that was approaching obsolescence when it was put on the lift. Now, to the latter factor is being reconditioning. The question is part of the Military Air Transport Service says: "The aircraft reconditioned C-54s are returning service in better

mechanical condition than when they were first assigned to the Airlift."

Example of cycle reconditioning is simple: replace the worn engine change periods (usually 1000 hours) to perform every scheduled item of maintenance, inspection and modification. Proposals claim these advantages:

- Utilization is increased through reduction of extreme unbalanced distribution.
- Dispersed time and less work are required for major (5000 hour) overhauls.

Perhaps the first commercial application to go into cycle reconditioning was Lockheed Aircraft Service, largest of the check lines during the airlift work for Airlift planes. L.A.S. got into cycle reconditioning in 1947, but turned out more than 200 planes. In addition to Airlift C-54s, it reconditioned Navy and Marine Corps B-24s, and just signed a \$741,140 contract to handle ten MATS Lockheed C-121 (Constellation).

L.A.S., at Burbank and MacArthur Field, Knoxville, N. Y., follows standards adopted by MATS for cycle reconditioning of Airlift C-54s. A plane is brought in after every 1000 hours of flight. Engines are removed and replaced (the old one sent to the Air Force engine overhaul base at San Antonio), and other items are reconditioned.

At 2000 hours the 1000 procedure is repeated, and after work done. At 1000 hours, a plane gets the 1000 hour test run, plus new overhauled Air 6000 hours, it gets the 1000, 2000 and 4000-hour reconditioning. A 5000 hour cycle consists of the 1000-hour and 5000-hour work. A 6000-hour cycle is the 1000, 2000, 3000 and 5000-hour work.

At 7000 hour mark, the plane gets through the 1000- and 7000-hour cycle. At 8000 hours, major overhaul is completed and plane starts through a new cycle.



2 Interior of plane is inspected. This shows the landing. B-24s Airlift planes rest table.



3 Takedown of the structure begins with removal of emergency control surfaces. These parts go to shop for overhaul.



6 At next station on L.A.S. line, landing gear and engine structure is moved, reconditioned, modifications made, and reinstalled.



7 Meanwhile, outer wing panel with structure is being inspected prior to reworking.



8 Reconditioned plane, ready for another thousand hours of service, goes through final engine run up and tests. L.A.S. has got periodic cycle work down to less than 5000 man-hours and about 20 days time. A tank stopping and reworking job adds about another 10 days. Approximately 450 components and items are removed from the airplane during the reconditioning process.



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Senate Group Asks New Air Legislation

Senate Interstate and Foreign Commerce Committee is expected to push for immediate enactment of new legislation both as a result of its comprehensive hearings on the airline financial situation.

They are:
• Authorization of \$300,000 for a Civil Aeronautics Board study to establish "service" rates for route segments of the scheduled system. The Committee's chairman, Sen. Edward Johnson (D-Calif.) will sponsor a provision that the plan for separate service and subsidy payments be carried out into effect July 1, 1959.

• Post Office Payments—Post Office Department would pay the carrier's service rates. Additional subsidy payments could be made by CAB. Congress would pass an such CAB appropriation for reimbursement.

• Requirement that CAB report to Congress on all pending cases, not only on route, but also on other matters.

• Debarred Carriers—Some carriers as debarred in some for the application that an "airline decision," Johnson commented. "We want good decisions based on sound judgment but letting them sit for long time, for example, doing so for three years is good example of intolerance and persecution by bureau. An arbitrary time limit cannot be placed on proceedings, but Congress should be advised so cases that are being 'dragged out'."

Johnson will also recommend that legislation setting up an independent Air Safety Board be reported out. Since the general attitude in Congress is to accept the House Commerce recommendations on compensation, it is concluded that the measure will be passed.

The House Commerce did not report its independent study board. It studied a transportation service as the Department of Commerce under which would come a Bureau of Civil Aviation, embracing the present activities of the Civil Aeronautics Administration and National Aeronautics Administration for research and technical independent study for CAB.

• Hearings Completed—The Senate committee was scheduled to read up its report June 30. The professional staff will continue studies in the airline field.

Action on route subsidies—a government program for cargo and transport airplane development; carriage of government traffic by air; regulation of contract agreements, etc.—will be postponed until the vote of the airline industry is known.

Airlines Seek More Military Business

The airlines have showed their feet a little further into the door of the \$100 million annual military transportation business by offering a 10 percent discount to military personnel. At the same time the National Military Establishment moved to insure revenue against offset use of commercial air transport.

The combination is expected to meet the wishes of military transportation business from the present 10 percent to about 10 percent-a dollar range from about \$1 million to \$10 million annually. The 10 percent military discount became effective July 1.

• Liaison Bureau—Air traffic controllers of the Air Transport Association will establish a military liaison office at Washington Headquarters to handle liaison with the National Military Establishment on official travel. Frank Macklin will head the new bureau.

The National Military Establishment now has a travel agreement with the airlines that will remain in effect until the end of the 1958 fiscal year. This agreement gave military personnel treatment on official military travel and retained air travel to the highest priority members. Referrals will assure their preferential treatment for the next fiscal year but the restrictions against air travel are now being slightly relaxed.

• New Study—Defense Secretary Louis Johnson has directed the Military Board to make a thorough study of military traffic policies with a view toward drawing up new travel purchase agreements by fiscal 1959. The NMB has indicated that it wishes to make more extensive use of commercial airlines for official travel.

Continental Sells DC-3s to Southern

Continental Air Lines has sold three DC-3 transports to Southern Airways Inc., Birmingham, Ala. Sale price with spare was \$146,000.

The planes were sold for \$45,000 each along with \$50,000 worth of spare parts. Southern Airways is a franchise which began operations on June 1.

Sale of the three aircraft was made possible by the negotiation of an agreement by Continental Air Lines between Denver and San Antonio with Continental Express on June 1. Continental plans gradually to sell more of its 11 DC-3s as it puts more Continental Express on its 1000-mile system. Southern Airways has an option to purchase additional DC-3 aircraft from Continental when the planes are required.



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Omni-Range Trainer

Omni Air Lines has produced a portable VOR (vortex range) system for use in training and transitioning pilots now being installed by the Civil Aeronautics Administration.

The Omni, Omni's superconductor of electromagnetic coils, uses a hand-held tracking unit as the basis of the set. The receiver, mounted in a lightweight carrying case with special lead wires attached, can be hooked up in any (unlimited) place in five minutes. The set is connected directly to the aircraft's location receiver.

Lead wires permit the box to be placed in the regular radio rack in the cockpit while the pilot uses his radio receiver. The receiver receiver can be placed conveniently in front of the pilot.

Used in demonstrating the unit at major stations on its eastern tour, the Omni is a definite asset to VOR in the process of being set up on the airways and low pilots are familiar with it. The driver shows a check on the accuracy of operation of newly installed VOR ranges.

SHORTLINES

► **American Airlines**—Began selling summer and fall vacation tours to Mexico, New England, Nova Scotia, Bermuda and Hawaii. Tickets from one can be purchased in conjunction with American's Latin line plan. Carrier's Convair-Learns finished their first year of scheduled service last month, carrying 1,021,900 passengers a total of 365,908,000 average mile.

► **Grand International Airlines**—Recently raised its 12th year of operation. Carrier's current revenue passenger miles in the last ten years increased 1150 percent. Benefit approved Travel Mid-Pacific cargo representative at Los Angeles, Dallas.

► **Eastern Air Lines**—Stockholders increased by approximately 500 when members of the field and advisory board of directors voted their director's for purchase of stock and voters in a 30 cent management contract were awarded blocks of stock at 30 cents.

► **Boeing Airline**—Will make weekly flights between Madrid and San Francisco, when bilateral agreements are concluded with Venezuela and the U.S.

► **LANSIA**—The inaugurated all-expense airlines on four lines to Mexico City in conjunction with Giant Tours of Mexico. Cost is only slightly higher than regular air fare from the border to Mexico City.

► **National Airlines**—Has joined with P & O Steamship Co. to offer a great boat between Hawaii and Manila. The company will use one ship on one contract, in turn on the other, at no added cost.

► **Northwest Airlines**—Took delivery on the first of its new Boeing 707s at Boeing Airplane Co.'s Seattle plant. Cost is the first delivered for domestic service. NWA's May revenues were the largest for any month in the carrier's history, according to Cecil Hartley, president and general manager. Gross revenue was \$15,878,726, net was \$12,664, compared to a net loss of \$12,030 in May, 1948. Freight and express revenues in May accounted for nearly \$19,000 of total revenues.

► **Pan American Airways**—Named Ruth and S. Mitchell supercargo of station for the carrier's Latin American division. He was formerly vice president operations for TWA and has been in PAA's operations department since September. Carrier last week celebrated its tenth anniversary of regular trans-Atlantic passenger service.

► **Panagra**—Started their weekly coastal chain service to Buenos Aires and points along the west coast of South America. Carrier uses 54-passenger DC-4s.

► **Pioneer Air Lines**—Has distributed to 10,000 businessmen a booklet called "I Can't Afford Not to Fly," aimed at selling Pioneer and commercial aviation in the Southwest.

► **SABENA**—Plans to resume service to Lybia, Israel, from New York, with one aircraft at Benghazi. Carrier will operate two flights weekly.

► **Swissair**—Will add a third weekly flight between Zurich/Geneva and New York.

► **Trans Caribbean Airways**—Is closing its third equipment trust financing through Citicorp, Kinsard & Ott, Inc. for a \$1,500,000, bears interest at 7 percent and matures in three years.

► **Western Air Lines**—Began servicing Covertine Line service between Los Angeles and Portland Oregon. The 805 mile trip will take 3 to 45 min.

CAB SCHEDULE

July 1st—Removal of 100,000 lbs. of aircraft from the Los Angeles (Docket 1012) July 1st—Removal of 100,000 lbs. of aircraft from the Los Angeles (Docket 1012) July 1st—Removal of 100,000 lbs. of aircraft from the Los Angeles (Docket 1012)

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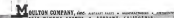
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(For two years **WILLIAM TILMAN** edited page 10 as editor of the *Aviation*. He has personally read all of your letters of the subject (as well as the government's) on one line listed that some of these letters were printing rather than advancing constructive air transportation. Among that group we have been described as some industries and trade circles as "airers," as not understanding before push back and as taking the "maker" that air transport is "difficult" because natural business and economic rules do not apply. We have always concluded that air transportation should be considered as a business. Recently, there is beginning to be expressed in lines the industry staff some of the same conclusions in favor of its status as a business. We shall report some from time to time. The last is below—(H. H. P.)

Airline President Looks at Fares & Coaches

(Continued from the Northwest Airlines First Release)

Northwest Airlines charged today that attempts by other airlines to block extension of air coach service at low fares must wait as direct opposition to the public interest and a wasteful public record.

The company presented an early air coach service between Seattle and Anchorage, Alaska and was the first scheduled airline to offer transcontinental coach service.

For the CAB or any other airline to impede the development of this new public service (especially a proposed Chicago-Portland coach-Bd Note) would be unfair to the airlines and to the public, which has plainly indicated its enthusiasm for a chance to travel by air at a cost comparable with coach class ground transportation," said Hester, president of Northwest and

Hester declared that Northwest's experience with transcontinental coach flights since their inception March 24 has proved three points beyond doubt:

1. Air coach service appeals to a large, new class of travelers, who have brought load factors to an average of higher than 90 percent on coach flights.
2. Coach service does not detract from business on first class flights—it runs in fact, even be a factor in strengthening flight generally. A rise in business on all Northwest's flights has accompanied the capacity load on the coach planes.
3. Extended development of coach service can be a large part of the answer to airline financial problems, and is a highly profitable phase of aircraft operations.

The government airline management and the interested public have been greatly concerned about financial problems during the past few years," Mr. Hester said.

"Now, in our development, coach class air travel gives every indication of being a major factor in putting the airlines into the black financially. Such common sense and a realistic attitude would indicate encouragement of coach service where it is clear it is developing profitable new traffic and dipping deeply into a warlike belt into aircraft touched by the airlines."

To back up his contention that the public through agencies of Northwest's coach flights Hester pointed out that since the new scheduled round trip a day began March 24, NW's coach planes have carried 20,098 passengers a total of 20,730,822 passenger miles. Load factors on both eastbound and westbound flights

have been consistently high, running in excess of 93 percent on eastbound flights and, during the first half of June, about 91 percent for both east and westbound.

That this extremely high load factor was not at the expense of load factors aboard Northwest's regular, standard flights is also evident.

Flight 10, a standard eastbound coast-to-coast flight paralleling the coach route, had a better than 70 percent load factor during May. Flight 7, a westbound flight, had a load factor of better than 61 percent out of New York to Minneapolis.

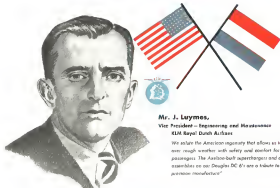
As for the charge in some quarters that coach fares are unprofitable, Hester noted that Northwest's revenue for May from coach operations was \$742,786—a tremendous high figure when it is considered that it represents such one round trip a day between the New York and Seattle terminals.

In its formal answer to United's objections, filed with the CAB, Northwest pointed out that all airlines had found that higher fares merely created the air travel market to shrink and meant lower total income. Northwest's pioneering experience with coach fares on the continent has been outstandingly successful.

Lower fares, not higher ones, offer the best promise of developing the air transportation market. Northwest pointed out that during 1946 it made several fare increases on the theory that because of increased costs, increased fares were necessary. However, experience shows that such fare increases resulted in further limiting the potential market for air transportation, and its total revenues went on correspondingly decreased.

In explaining factors which made possible its coach service at reduced fares, the airline cited the better utilization of equipment, the reduction of idle airplane time, the elimination of longer services and the lower cost of DC-4 equipment to a combination large passenger type through the use of folding seats, thereby as accommodating additional cargo movement.

Northwest's proposed one-way fare of \$70 between Chicago and Portland would yield Northwest 7849 per mile on the basis of the mileage flown over Northwest's route between Chicago and Portland. On the basis of the average passenger load factors of 87.01 percent experienced on Northwest's 75 passenger airplane coach service for the month of May, 1949, on the basis of most recently experienced operating costs it is clear that the proposed service will be profitable.



Mr. J. Luyms,

Vice President - Engineering and Maintenance
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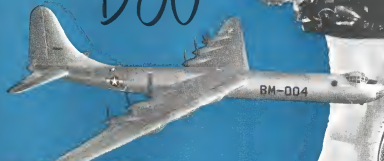


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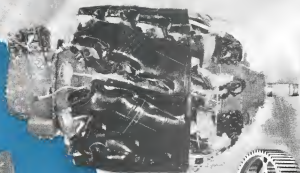
From Fort Worth to Minneapolis—Minneapolis to Great Falls—Great Falls to Key West—Key West to Denver—Denver to Spokane—Spokane to Fort Worth—that was the itinerary of the Convair B-36, the Air Force's mighty bomber. A 9,600-mile non-stop, non-refueling flight completed in March.

In the Pratt & Whitney Wasp Major engines that powered this bomber on its epoch-making flight were "A-Q" Gears made by Foote Bros.—gears that achieve a new standard of precision coupled with light weight—gears that are capable of carrying extraordinary loads at high speeds.

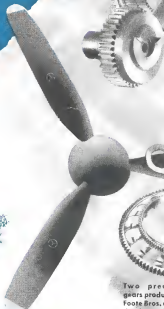
Foote Bros. "A-Q" Gears served too in the "custom-built" Curtiss-Wright propellers that pushed the B-36 on its successful flight. These gears helped make possible such features as reversible pitch for smoother, shorter landings—automatic synchronization which enables the pilot to control six engines as one with single lever action.

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